# EDISON ELECTRIC INSTITUTE BULLETIN

## SEPTEMBER, 1936


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EDISON ELECTRIC INSTITUTE

# STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

*Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry*

## DURING THE MONTH OF JULY (Preliminary)

| | 1936 | 1935 | % |
|---|---|---|---|
| **Killowatt-hours Generated* (net)** | | | |
| By Fuel | 6,219,551,000 | 4,501,297,000 | +38.2 |
| By Water Power | 2,819,093,000 | 3,195,497,000 | −11.8 |
| Total Killowatt-hours Generated | 9,038,644,000 | 7,696,794,000 | +17.4 |
| **Additions to Supply** | | | |
| Energy Purchased from Other Sources | 167,875,000 | 194,011,000 | −13.5 |
| Net International Imports | 112,526,000 | 63,528,000 | +77.1 |
| Total | 280,401,000 | 257,539,000 | + 8.9 |
| **Deductions from Supply** | | | |
| Energy Used in Electric Railway Departments | 42,036,000 | 42,179,000 | − 0.3 |
| Energy Used in Electric and Other Departments | 113,519,000 | 115,489,000 | − 1.7 |
| Total | 155,555,000 | 157,668,000 | − 1.3 |
| **Total Energy for Distribution** | **9,163,490,000** | **7,796,665,000** | **+17.5** |
| **Energy Lost in Transmission, Distribution, Etc.** | **1,644,387,000** | **1,531,293,000** | **+ 7.4** |
| **Kilowatt-hours Sold to Ultimate Consumers** | **7,519,103,000** | **6,265,372,000** | **+20.0** |
| **Sales to Ultimate Consumers (kwhr)** | | | |
| Domestic Service | 1,159,479,000 | 1,051,873,000 | +10.2 |
| Commercial—Small Light and Power (Retail) | 1,317,098,000 | 1,127,634,000 | +16.8 |
| Commercial—Large Light and Power (Wholesale) | 4,361,677,000 | 3,468,026,000 | +25.8 |
| Municipal Street Lighting | 171,263,000 | 170,435,000 | + 0.5 |
| Railroads—Street and Interurban | 342,253,000 | 329,322,000 | + 3.9 |
| Railroads—Electrified Steam | 98,843,000 | 67,214,000 | +47.1 |
| Municipal and Miscellaneous | 68,490,000 | 50,868,000 | +34.6 |
| Total Sales to Ultimate Consumers | 7,519,103,000 | 6,265,372,000 | +20.0 |
| Total Revenue from Ultimate Consumers | $167,671,900 | $151,214,800 | +10.9 |

## DURING TWELVE MONTHS ENDING JULY 31st

| | | | |
|---|---|---|---|
| **Kilowatt-hours Generated* (net)** | | | |
| By Fuel | 63,282,150,000 | 52,769,683,000 | +19.9 |
| By Water Power | 36,346,527,000 | 34,980,435,000 | + 3.9 |
| Total Kilowatt-hours Generated | 99,628,677,000 | 87,750,118,000 | +13.5 |
| Purchased Energy (net) | 3,032,449,000 | 2,888,876,000 | + 5.0 |
| Energy Used in Electric Railway and Other Departments | 1,941,871,000 | 1,973,662,000 | − 1.6 |
| **Total Energy for Distribution** | **100,719,255,000** | **88,665,332,000** | **+13.6** |
| **Energy Lost in Transmission, Distribution, Etc.** | **16,563,397,000** | **15,279,127,000** | **+ 8.4** |
| **Kilowatt-hours Sold to Ultimate Consumers** | **84,155,858,000** | **73,386,205,000** | **+14.7** |
| **Total Revenue from Ultimate Consumers** | **$1,998,104,900** | **$1,879,108,800** | **+ 6.3** |
| **Important Factors** | | | |
| Percent of Energy Generated by Water Power | 36.5% | 39.9% | |
| **Domestic Service (Residential Use)** | | | |
| Average Annual Consumption per Customer (kwhr) | 701 | 652 | + 7.5 |
| Average Revenue per kwhr (Cents) | 4.84¢ | 5.17¢ | − 6.4 |
| Average Monthly Bill per Domestic Customer | $2.83 | $2.81 | + 0.7 |

## BASIC INFORMATION AS OF JULY 31st

| | | | |
|---|---|---|---|
| **Generating Capacity (kw)**—Steam | 24,052,100 | 23,712,020 | |
| —Water Power | 9,011,800 | 8,955,693 | |
| —Internal Combustion | 499,400 | 499,939 | |
| Total Generating Capacity in Kilowatts** | 33,563,300 | 33,167,652 | |
| **Number of Customers** | | | |
| Farms in Eastern Area (Included with Domestic) | (632,150) | (549,494) | |
| Farms in Western Area (Included with Commercial—Large) | (234,738) | (215,057) | |
| Domestic Service | 21,356,627 | 20,859,006 | |
| Commercial—Small Light and Power | 3,779,743 | 3,749,769 | |
| Commercial—Large Light and Power | 509,072 | 506,076 | |
| Other Ultimate Consumers | 61,781 | 67,403 | |
| Total Ultimate Consumers | 25,707,223 | 25,182,254 | |

* By courtesy of the Federal Power Commission, with deductions for certain plants not considered electric light and power enterprises.
** Old Series both years—subject to revision to agree with data contained in Statistical Bulletin No. 3.

**Vol. 4, No. 9, Edison Electric Institute Bulletin**; published monthly. Entered as second-class matter Aug. 17, 1933, at the post office at Philadelphia, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia, Pa. Editorial office, 420 Lexington Ave., New York, N. Y. Subscription rate, $2.00 per year in the United States; $3.00 per year in foreign countries.
*The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the* Bulletin.

EDISON ELECTRIC INSTITUTE BULLETIN

Volume 4 SEPTEMBER, 1936 No. 9

# The Third World Power Conference

## Institute Will Publish Digests of the Conference Papers

THE Third World Power Conference was held in the City of Washington, D. C., from September 8th to September 14th, 1936. It was attended by several hundred foreign delegates and representatives and by a representative group of American members of about equal number. Inasmuch as no registration lists and no totals of attendance have been published, it is not possible to state the exact attendance. The gathering was representative, however, of those concerned with the management of the business of electric power supply throughout the world, the only notable deficiency being in American representation of design and operating engineers, since the foreign members from industrial countries were well represented in this respect.

The proceedings comprised seventeen general sessions for the presentation and discussion of papers, four official functions, including an address by the President of the United States and a banquet, and various executive meetings and social functions. The business of the Conference is, of course, conducted in the general sessions and these were attended by the members in numbers varying from one hundred to three hundred. Sessions were of two hours length and there were, therefore, some forty hours available for dispatch of the business of the Conference, which comprised more than two hundred papers and discussions thereon. Digests of the more important papers will be undertaken by the Institute and published in subsequent issues of the Bulletin.

Under the circumstances it is obvious that careful advance planning was imperative. This was well provided so far as the duties of presiding officers and sessions secretaries and interpreters were concerned, and with respect to the four official languages. The most notable deficiency was with the availability of papers for study in advance of the meeting. This difficulty is, no doubt, present in all formal conferences, and more so when international distances are involved, but in the present case it aroused considerable adverse comment among foreign members, most of whom had not seen any of the papers in their final form, up to the day of the opening of the Conference. The delay was most marked with respect to American communications, especially those from authors identified with the Government; some of these were actually not available on the first day of the Conference. On the other hand, European communications were, in general, available well in advance, and some of them in English translation.

The American National Committee had proposed, and had procured the assent thereto of the International Executive Council of the World Power Conference, that the subject of the meeting should be the "National Power Economy" and papers were requested to be submitted in conformity with a definite schedule of topics conforming to the announced motif, eighteen in all. Since rather highly particularized outlines or analyses for each paper were circulated with the invitations it was inevitable, perhaps, not only that the general tenor of the communications should be predetermined, but that they should have a certain synthetic quality and, as a whole, a certain monotony that might not have appeared if the various national contributors had been left free to select their own treatments addressed to the general theme selected. Nevertheless the communications, as a whole, contain an invaluable store of statistical and factual data, even if their messages are not, in all cases, as impressive as they might otherwise have been.

The extirpation of technology from the program was disappointing to most of the foreign visitors. By far the greater number of them were men actively identified in one way or another with the actual conduct of electric power supply and they stated, on every hand, that the achievements of the industry in America were held in the highest esteem abroad and they wanted opportunity to study them at first hand. A typical expression, often heard, was to the effect that while they were willing to philosophize concerning national power economy to a reasonable degree, what they urgently wanted was to study the practice of the existing American industry with respect to such subjects as switchgear, sales promotion, lightning protection, advertising, and a hundred other homely but practical topics that engage the attention of experienced managements abroad as well as here.

This the foreign members proceeded to do at every reasonable opportunity, practically at all times except during the actual sittings, and this they will apparently continue to do throughout their respective American sojourns, since numberless engagements were made to visit operating plants, company offices and manufacturing plants, all with the object of studying and comparing American technology and business practices with that of the countries of the visitors. Besides these many privately arranged visits

and inspections, the post-conference tours have been well subscribed, providing as many of them do for similar visits and opportunities for discussion with American industry experts in many cities.

The program as arranged tended naturally to bring the current American question of public ownership to the front and many able American communications were elicited upon this subject. So far as foreign visitors were concerned, however, with Italy reporting 95 per cent private supply, Belgium 85 per cent, and Great Britain pointing to the "Grid" as privately owned and to the McGowan Report, the subject seemed to have little interest. It was perhaps inevitable that on two or three occasions there occurred ill-timed and undoubtedly unforseen interjections of purely local political propaganda, quite foreign to the subjects at hand and strongly suggestive of the American flagpole sitting or pie-eating contest or other manifestations of publicity at any price. These aberrations are not unfamiliar to Americans of course, but they obviously puzzled the more sedate European members, who, although studiously polite, could hardly conceal a certain impatience with these extraneous and not very considerate interruptions.

As a matter of fact it appeared to be extremely difficult to arouse any lively interest among the European members upon any question of public ownership, much less a fervent interest. In Europe, as everyone knows, there is relatively a larger amount of public ownership of all kinds of services than in American, but, outside of Russia there are also large investments in private ownership. To the European members of the World Power Conference this appears to be a question of distinctly subordinate importance. The formal papers submitted by Europeans reflect this unconcern, but it was unmistakable in the formal discussions and in informal conversations.

The important thing, as expressed by these foreign representatives was whether electricity supply systems were well designed and well managed. Even from the more abstract considerations of national economy of resources, their concern is expressed with the technologic, rather than the political, means for avoiding waste and promoting conservation. If there was one point more than another that stood out as the keynote of the Conference, it was that succinctly expressed by one of the European delegates, "Power and politics won't mix."

# A British Comment on the McGowan Report

IN discussing his World Power Conference paper at Washington, Mr. John C. Dalton, Manager of London County Electric Supply Company, Ltd., made interesting comments on the McGowan Report, which was reviewed in the August Bulletin. Mr. McGowan said:

"I am glad of this opportunity for discussion of my own paper, as I should like to supplement it in an important particular. You may have noticed that I stressed the point that Private Utilities in Great Britain are fortunately free from political violence and can rely upon a "square deal" from the Regulatory Bodies. I mention in the last paragraph that the Government had set up a Committee to investigate the question of a reorganization of the Distribution System of the Country. Since my paper was written that Government Committee have published their findings and I think I can usefully supplement my paper by a brief reference to the conclusions of this important Committee.

"The Committee consisted of Sir Harry McGowan (Chairman, Imperial Chemical Industries), Sir John Snell (Chairman, Electricity Commission) and Mr. John Morison, an Eminent Accountant. The Report is known as the McGowan Report.

"The Committee reject the suggestion which was strongly advanced by certain political factions that all Private Utilities should be bought out and come under public control: the suggestion is not only rejected but it is strongly rejected for reasons given. The Committee recommend principally the retention and utilization of the larger and more efficient undertakings and the absorption by such undertakings of the smaller and less efficient undertakings. The Report sets out the machinery for this process of absorption: the terms of acquisition to the smaller public and private utilities so to be absorbed must be fair compensation and in the case of acquisition of small companies there is to be included compensation for loss of future profits.

Other recommendations and conclusions are as follows:

(a) That Joint Electricity Authorities (described in my paper) should undergo investigation as to their constitution as it had been advanced before the Committee that constitution on an elective basis was not suitable.

(b) That as to Holding Companies the evidence placed before the Committee disclosed the advantages of this form of amalgamation in effecting central management, central purchasing and provision of finance. The Committee also find that most of the Holding Company groups have operated efficiently and have done good work. It is stated that while there are potentialities of abuse in this form of financial structure the evidence placed before the Committee does not lead to the conclusion that such abuse has occurred, and that the criticism of Holding Companies can only be applied to a limited number. It is recommended that the approval of the Electricity Commission be required in future to the terms of issue of any new capital and and that the accounts of Holding Companies be subject to official audit.

(c) That duplicate powers wherever they exist in the same area should be eliminated and that it is essential to prevent the splitting up of comprehensive undertakings by any piecemeal purchase by municipalities at the end of a concession period.

(d) The consolidated undertakings which will result from these recommendations are to aim at uniformity of tariffs.

(e) That municipalities might be empowered to participate in a guarantee of revenue in connection with rural supplies given by private utilities where the return is incommensurate to the expenditure.

(f) It is desirable that a uniform rating method be applied to all electricity undertakings both public and private.

"With this brief outline of such an important Report I can only conclude by recommending its study to you in detail.

"I may be allowed finally to repeat a plea which I made at the National Convention in England, namely, if we want to develop our Industry to the advantage of our consumers and the millions of small investors in our stocks, let us for Heaven's Sake keep the Politicians away from this Industry of ours to which we are all so proud to belong."

# Retail Use of Electricity in Europe

By Henry G. Knaf
*Consolidated Edison Company of New York*

THE domestic class of service, because it represents by far the largest group of consumers, has always been looked upon as a standard by which to judge the usefulness of the service of the Electric Light and Power Industry to the public. Power statistics in the United States contain a vast amount of detailed information on this point reaching back over a great many years.

When European power statistics are searched with a view toward comparing the domestic electric business there to that in the United States, it is readily found that it is generally not possible to isolate this class of service, since due to the prevailing rate set-ups in Europe a distinction between domestic and small commercial lighting is not made.

It is, however, possible to establish a class of service which may be termed "Retail Use" and which corresponds to a combination of the two classes, i. e., the Domestic class and the class called "Commercial—Small Light and Power (retail)" as found in American Power Statistics. Even though the definitions of this "Retail Use" in the various countries of Europe, which will be treated here, do not coincide precisely with its definition in the United States—where it generally includes demands up to 50 kilowatts—they are sufficiently close in the main to warrant an attempt to compare Retail operations of European utilities to those in the United States.

In the following, data on "Retail Use" for seven countries in Europe will be presented, namely for Great Britain, Germany, France, Italy, Sweden, Switzerland and Norway. The first four are taken, because they are the largest, most populous industrial nations outside of Russia, the other three are chosen on account of the high degree of development their Electric Light and Power Industry has reached.

The figures shown are the kilowatthour Retail sales by utilities in each country, Retail sales in percent of total sales, average annual Retail use per capita of population, the number of Retail consumers, the average annual kilowatt hours per Retail consumer, and finally the price per kilowatthour

MR. KNAF

realized for this use. The latter is expressed in terms of hourly wages of a male skilled worker in the metal industry in order to correlate the Retail price of electricity with purchasing power. Besides this, the percentage of homes electrified will be indicated and reference will be made to domestic use per consumer, price per kilowatthour and saturation of major appliances where such information is available.

It must be noted that Statistics of the Electric Light and Power Industry in Europe are by no means as complete and exhaustive as those in the United States. While they generally report their "Retail operations," not all of the countries report the number of Retail consumers or meters, necessitating in some cases derivations in order to establish the average annual use per consumer. In some instances the reports cover only part of the industry. As to revenue from sales and price per kilowatthour the information found is very incomplete and fragmentary and widely scattered sources had to be used. Since later data are not always available the figures shown are those for the year 1933. Where other years were used, mention is made of it.

**U. S. A. Statistics For Use In Comparisons[2]**

In the following, figures for the United States are set forth, for use in comparisons:

Retail Sales—24.4 billion kwhr
Retail Sales in per cent of total sales—37.2 per cent
Number of Retail consumers—23.5 million
Annual Retail use per capita—193 kwhr
Annual Retail use per consumer—1,042 kwhr (1934: 1,085 kwhr)
Price per kilowatthour of Retail use—4.92¢ (1934: 4.6¢)
Annual Average Domestic Use per consumer —604 kwhr (1934: 626 kwhr)
Price per kilowatthour of Domestic Use—5.49¢ (1934: 5.3¢)
Percentage of Homes Electrified[3]—1933: 66.7 per cent; 1934: 67.1 per cent; 1935: 68.0 per cent

Major domestic appliances for 1934 are as follows:

| | *Number* | *Saturation** |
|---|---|---|
| Ranges | 1,050,000 | 3.4 per cent |
| Water Heaters | 300,000 | 1.0 per cent |
| Refrigerators | 5,820,000 | 19 per cent |
| Radios | 18,500,000 | 60 per cent |

*Based on total number of families.

*Hourly wages in the Iron and Steel Industry*[4] are found to exhibit considerable variations since 1930, a phenomenon not found in any of the other countries with the exception of Germany. These variations are not followed by the Retail price of electricity. Thus it seems appropriate, when expressing the Retail price of electricity in terms of those hourly wages, to use the U. S. average for five years, as shown below:

| *Year* | *Cents per Kwhr Retail Use* | *Hourly Wages* | *Costs per Kwhr in Per Cent of Hourly Wages* |
|---|---|---|---|
| 1930 | 4.97¢ | 67.1¢ | 7.4% |
| 1931 | 4.92¢ | 65.8¢ | 7.5% |
| 1932 | 4.81¢ | 49.4¢ | 9.7% |
| 1933 | 4.92¢ | 46.5¢ | 10.6% |
| 1934 | 4.60¢ | 67.3¢ | 6.8% |
| Average Percentage—8.4 per cent | | | |

### Retail Use In Seven European Countries Combined

Before setting forth the data on the seven European countries separately, some figures for the whole group are contrasted with the corresponding figures for the United States, in order to afford a better impression of the magnitude of the Retail electric business in the United States. (See table in the two adjoining columns.)

RETAIL USE OF ELECTRICITY IN SEVEN EUROPEAN COUNTRIES COMPARED WITH UNITED STATES

| | *Seven European Countries Combined* | *United States* |
|---|---|---|
| Area in Square Miles | 896,457 | 2,973,776 |
| Population | 208 million | 126 million |
| Density of Population per sq. mile | 232 | 42 |
| Retail Sales in Kilowatthours | 14.3 billion | 24.4 billion |
| Annual average Retail Use per capita | 68.5 kwhr | 194 kwhr |
| Annual average Retail Use per consumer | 396 kwhr | 1,042 kwhr |

### Data on the Individual European Countries

#### GREAT BRITAIN

Retail Sales—3.92 billion kwhr[5]
Retail Sales in percent of total sales—35.2 per cent
Annual Retail Use per capita—84 kwhr
Annual Retail Use per consumer—640 kwhr
Price per kwhr of Retail Use—2.28d
Hourly wages for metal worker—15.5d[3]
Price per kwhr in per cent of hourly wages 14.7 per cent

Retail use in Great Britain comprises lighting, heating, cooking and use under general rates for domestic, industrial, commercial, agricultural and other establishments not billed under power rates. Since the number of Retail consumers is not reported separately, the number of all consumers, 6.1 million,[5] is used and the number of large industrial consumers is neglected. Domestic consumers alone are given by British sources[6] as 4.9 million which means that only 43.6 per cent of the 12 million homes in Great Britain were electrified in 1933. In 1934 and 1935 this value had risen to 47.8 and 54 per cent respectively. This low percentage of homes electrified undoubtedly finds its explanation in the early development of the gas industry and in the low price of gas which causes this fuel to be still widely used for illumination. In judging the annual average domestic use per consumer, which has been estimated by English observers to be 460 kwhr in 1933, consideration must be given to the low percentage of homes electrified.

Of major appliances only ranges are reported. Their number is given as 400,000,[7] a figure which possibly includes also table stoves and hot plates. The saturation of ranges on the basis of the number of all homes becomes 3.3 per cent. An estimate of refrigerators shows 25,000 or a saturation of only .2 per cent.

#### GERMANY

Retail Sales—3.0 billion kwhr[8]
Retail Sales in per cent of total sales—23.3 per cent
Annual Retail Use per capita—46 kwhr
Annual Retail Use per consumer—240 kwhr
Price per kwhr of Retail Use in 1930—28.5 Pfennig
Hourly wages for metal worker in 1930—95.4 Pfennig[3]
Price per kwhr in per cent of hourly wages—30 per cent

In German power statistics Retail use appears as one distinct class called *Kleinabnehmer*. The annual use per consumer of 240 kwhr is based on reports for utilities selling about 91 per cent of all energy in Germany.[9] They report 11.4 million Retail users; by prorating, their total number becomes 13.5 million. The use of 240 kwhr per consumer has been practically stationary in the years since 1930. Therefore, it is quite safe to use the revenue figures for 1930, the latest year for which official reports are available which cover about 84 per cent of all sales.[10] The price of 28.5 Pfennig per kwhr, reported there, is expressed as a percentage of the hourly wages for 1930. Germany is the only country, other than the United States, whose wages show a decided fluctuation. For instance, they range from 95.4 Pfg in 1930 to 90.6 in 1931 to drop in 1932, 1933, 1934 to 78.1, 78.0 and 77.9 respectively.[3] The use of the 1930 wage figure shows therefore a low price per kwhr since it is improbable that energy prices have declined as much as wages.

Retail sales by the above mentioned group of utilities accounting for 91 per cent of total German sales in 1934 had amounted to 3 billion kwhr of which 1.5 billion represented domestic use according to German estimates.[11] With the number of domestic consumers placed at 11.5 million[12] the use per domestic consumer becomes 130 kwhr.

Percentage of homes electrified in 1934, with a total of 17.7 million[13] households, becomes 65 per cent when using the above figure of 11.5 million electrified homes.

Use of major appliances in Germany is reported as follows for 1934:[14]

| | *Number* | *Saturation* |
|---|---|---|
| Ranges | 142,000 | .8 per cent |
| Water heaters | 68,200 | .45 per cent |
| Refrigerators[15] | 30,000 | .2 per cent |
| Radios | 5,053,000 | 28.6 per cent |

In connection with refrigerators it is interesting to note that the price of one of about 3.5 cu. feet capacity offered by a reputable manufacturer is 420 R Mark. This is 14 per cent of the 1934 average family income of 2970 RM.[16] In the United States an equivalent refrigerator would represent only about 7 per cent of the 1934 family income. Therefore, the real cost of a refrigerator in Germany is twice the cost in the United States.

#### FRANCE

Retail Sales—2.5 billion kwhr[17]
Retail Sales in per cent of total sales—27.2 per cent
Annual Retail Use per capita—60 kwhr
Annual Retail Use per consumer—256 kwhr
Price per kwhr of Retail use in 1931—1.8 francs
Hourly wages for metal worker in 1931—4.7 francs[3]
Price per kwhr in per cent of hourly wages—38 per cent

In French power statistics utility sales are subdivided according to High and Low Tension. The latter, representing Lighting, Domestic Uses and Small Power, is considered equivalent to Retail Use. Public Lighting, estimated as 1.5 per cent of total sales—a fair average for those European countries where it is known—is eliminated from Low Tension Sales. Retail consumers are reported as 9.4 million. Even though no revenue figures are available, there is some information on average kwhr prices for the two divisions of Low Tension Energy, Lighting with Domestic Uses and Small Power for 1931. This permits the formation of an average on the basis of the share of these two divisions in total Retail Sales of 63 and 37 per cent respectively.

Hourly wages for metal workers in France are reported separately for Paris and for all towns with more than 10,000 inhabitants.[3] By weighting accord-

ing to population a national average of 4.7 francs is obtained. In connection with the price per kwhr it should be mentioned that sales prices in France due to governmental decrees in 1935 have been reduced by 10 per cent.

The percentage of homes electrified can be derived from the number of Retail consumers of 9.9 million in 1934. All households are given as 12.8 million.[18] From observations in U. S. A., Great Britain and Germany, where available figures show consistently that the ratio of commercial consumers to all households is between 10 and 12 per cent, 1.28 million of the 9.5 million Retail consumers can be designated as commercial consumers, leaving 8.6 million Domestic consumers. The percentage of homes electrified can therefore safely be placed within the range of 67 and 77 per cent.

Major appliances in France are reported as follows:

| | *Number* | *Saturation* |
|---|---|---|
| Cookers and Ovens (1935)[21] | 55,000 | .4 per cent |
| Water heaters (1935)[21] | 47,000 | .4 per cent |
| Refrigerators (1934)[20] | 23,800 | .2 per cent |
| Radios (1934)[19] | 1,730,250 | 13.5 per cent |

### ITALY

Retail Sales—877 million kwhr[22]
Retail Sales in per cent of total sales—12.1 per cent
Annual Retail Use per capita—20.6 kwhr
Annual Retail Use per consumer—165 kwhr
Price per kwhr of Retail Use (inclusive of tax)—1.5 lire; (without tax) 1.0 lira
Hourly wages per metal worker—3.0 lire[1]
Price per kwhr in per cent of hourly wages (incl. of tax)—50 per cent; (without tax) 33 per cent

Retail Use in Italy comprises two categories, one termed *Illuminazione Privata* or Private Lighting which covers demands below 20 kw and includes also commercial uses such as store lighting, power for theatres, restaurants, offices and another category *Uso domestico* or Domestic Use which includes also some commercial uses. Kwhr prices for the first of the two categories are available for 1934 for 48 towns comprising 20 per cent of Italy's population.[23] By weighting according to population, an average of 1.22 lire per kwhr is obtained which becomes 1.88 lire when a tax which the government imposes on the sale of electric energy under this category is added. For the second category an average price of .35 lire is shown.[24] Since the two categories of Retail use are 76 and 24 per cent respectively of the total, the average Retail price becomes 1.00 lira without tax and 1.5 lire with tax, when a weighted average is formed.

The percentage of homes electrified is given by an Italian statistician[25] as 53 per cent, which he derived by dividing 5.3 million, the number of all "Private Lighting" consumers, by 10 million, the total number of families in Italy. Even though the number of purely Commercial consumers may be comparatively low, the total number of Retail consumers must by necessity include some commercial establishments that are metered independently from a residence, as evidenced by the fact that in Florence, for example, only 30 per cent of the stores are electrified.

For this reason 53 per cent must be considered the upper limit.

Major appliances in Italy are reported as follows for 1931:[26]

| | *Number* | *Saturation* |
|---|---|---|
| Ranges | 32,600 | .3 per cent |
| Water heaters | 10,600 | .1 per cent |
| Refrigerators | 1,900 | .02 per cent |

### SWEDEN

Retail Sales—634 million kwhr[27]
Retail Sales in per cent of total sales—28 per cent
Annual Retail Use per capita—100 kwhr
Annual Retail Use per consumer—431 kwhr
Price per kwhr of Retail Use—16.7 öre
Hourly wages for metal worker—1.11 kroner[1]
Price per kwhr in per cent of hourly wages—15 per cent

As the number of Retail consumers and revenue for Retail Sales for all of Sweden are not reported, statistics which are available for 28 towns and cover approximately 17 per cent of total utility sales were used to establish the annual kwhr use per consumer and the kwhr price.[28] According to these statistics the annual Retail use per consumer becomes 431 kwhr at an average price of 16.7 öre per kwhr.

Because of lack of information an estimate had to be made for the percentage of homes electrified. On the basis of 50 per cent electrification of rural[29] and practically 100 per cent of urban districts,[28] about 70 per cent of Swedish homes appear to be served with electricity. Some foreign estimates, however, place the figure above 80 per cent.

Ranges are the only appliances reported. Their number is given as 13,000 resulting in a saturation of .7 per cent.

### SWITZERLAND

Retail Sales—1123 million kwhr[31]
Retail Sales in per cent of total sales—50 per cent
Annual Retail Use per capita—272 kwhr
Annual Retail Use per consumer—910 kwhr
Price per kwhr of Retail Use—12 centimes
Hourly wages for metal worker—1.41 francs[1]
Price per kwhr in per cent of hourly wages—8.5 per cent

After deducting 53 million kwhr for public lighting, 1123 million kwhr remain for Retail use. There are 1.3 million[31] meters reported for Switzerland. This figure, however, includes also other equipment for controlling the sale of energy, namely maximum demand limiting devices, used by about 20 per cent of the consumers. Since there are some consumers using both a maximum demand limiting device and a kwhr meter, the above figure of 1.3 Million which contains also a small number of Wholesale power meters is decreased by 5 per cent. The remaining 1.23 million contain about 1.1 million domestic consumers, leaving 130,000 Commercial consumers. This would make the number of Commercial consumers equal to 12 per cent of all homes, which is about the same as observed in U. S. A., England and Germany. The price reported for Retail use is 12 centimes per kwhr.[32]

The percentage of homes electrified in Switzerland has reached the high degree of 98 per cent.[33] One factor in this achievement is undoubtedly the density of population of 260 per square mile.

Appliance saturation is high, being above 10 per cent for both ranges and water heaters. The latter are reported for 1934 as 136,000.[33]

Attention has to be drawn to the fact that Switzerland has an abundance of cheap and dependable water power, the development of which was hastened by the World War, when coal imports were endangered. Switzerland is now in a position to export electrical energy to the extent of more than a billion kwhr, which is about equal to the Retail use of the country.

### NORWAY

Retail Sales—2053 million kwhr[34]
Retail Sales in per cent of total sales—84 per cent
Annual Retail use per capita*—720 kwhr
Annual Retail use per consumer—3200 kwhr
Price per kwhr of Retail use—3.5 öre
Hourly wages for metal worker—1.32 kroner[1]
Price per kwhr in per cent of hourly wages—2.7 per cent

*In the Third World Power Conference Paper 10 per cent is deducted from the figures reported in *Norges Elektrisitetsforsyning*, 1935, to account for distribution losses.

After deducting 30 million kwhr for Public Lighting—obtained by prorating the 9.3 million kwhr reported for Oslo for the total urban population—the Retail use becomes 2053 million kwhr. This amount includes two cate-

gories, first: lighting, cooking and heating, second: small factories, industrial handicraft and agriculture.

The numbers of Retail consumers, not being reported, must be derived. The percentage of homes electrified, is shown to be 69 per cent.[35] That means 560,000 of the approximately 820,000 homes are served by electricity. When the number of commercial consumers is taken to be 10 per cent of all households, based on observations in U. S. A., England and Germany, the number of all Retail consumers becomes 640,000.

The kwhr price is only reported for all utility sales, which amount to 2445 million kwhr. The price is 3.12 öre per kwhr.[35] If the assumption is made that the 362 million kwhr for Industrial Power and Traction sell at a negligible price, the theoretical maximum price for Retail use becomes 3.7 öre. Therefore, 3.5 öre seems a logical price per Retail kwhr.

The development of the electric light and power industry in Norway is unique in more than one respect. Endowed more than any other country with abundant and favorably located water power and stimulated by the dangers during the World War to its coal imports—lacking resources of its own—Norway has made enormous strides in developing its water power resources. Due to the practical independence of the cost of electric energy generated by water power from its time of use, and the high price of gas and coal, electricity can be sold in Norway under rates which are competitive, even for heating. Nearly 90 per cent of all domestic consumers are billed under flat demand rates using maximum demand limiting devices. Such rates of course tend to encourage the use of electricity for water heating, room heating, and electric cooking. The use of various types of accumulation devices to store heat during night time, is widespread.* This has brought about average annual load factors for the individual Retail consumer that range between 30 and 40 per cent,[36] as compared to values of about 10 per cent in U. S. A. Average non-coincident demands, thereby, stay below 1000 watts per consumer.[36] This in turn has resulted in annual station load factors of 60 per cent and more.

*It should be noted that there has been a tendency in Norway away from the flat demand rates towards kwhr rates to encourage full time electric cooking while, so far, it consisted mainly of part time and supplementary cooking. In this connection it was pointed out that under the present rates, nearly two-thirds of the energy is "wasted" by the consumer.[36]

These are vital factors in bringing about low prices for electric energy in Norway. In addition, the financial aspects have to be considered. It is worthy to note that the utilities—mostly under public ownership—have not only paid no taxes but have been permitted to operate under a deficit for ten years, with the exception of 1934 where there is a profit shown of little more than one per cent.[35]

Obviously, when comparing a country like Norway with the United States, one must also bear in mind that there are less consumers in Norway than there are, for instance, in Chicago. The unique position that is enjoyed in Norway by a few hundred thousand consumers, is not easily paralleled by a country, numbering 40 times as many and spread over half a continent. It is more appropriate to look to some subdivision of the United States for such a comparison. There are the two states of Washington and Oregon, for example, with a combined population and area which are not much smaller than those of Norway, and a geographical and topographical make-up which is not much different from that of Norway. The population density of the two States stands even lower than Norway's, namely 16 per square mile against 24. Power in these two states is generated to the extent of 94 per cent by water power. It is interesting to note that the average Retail use per consumer in Oregon and Washington reaches (1933) 1652 kwhr a year at an average price of 2.74 cents a kwhr.[4] This corresponds to 4.6 per cent only of an average U. S. A. metal worker's hourly wage of 59 cents when an average of the years 1930 to 1934 is taken.

**Electricity Three Times as High in Europe on Comparative Basis of Wage Earners' Pay**

To investigate in detail, the historical and social conditions, the economic background, the government policies with regard to utilities, the questions of private or public control and ownership, the state of public opinion and a number of other questions related to the development of utilities in all of these countries, would hardly be possible within the scope of this article. It should, however, be brought to attention that in these seven countries, as a group, municipal ownership is more widespread than in the United States. In this light the low price per kwhr of Retail energy in the United States, expressed in terms of hourly wages of a metal worker, of 8.4 per cent against 27 per cent for those seven European countries combined is not without significance.

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# Home Electric Uses Depend on Sales Efforts

## *New Business Activities Develop High Residence Consumption for Pacific Coast Company*

**By Lewis A. McArthur**

*Vice-President, Pacific Power & Light Company*

In September, 1935, the Washington department of public service conducted an investigation of Pacific Power & Light Company's rates and practices in the state of Washington. Among other things, the department questioned the necessity of much of the company's proposed new business activity. It was the Pacific company's position that new business activity was highly essential if the company was to maintain its position among the leaders in average kilowatthour sales in the home. Mr. McArthur outlined the position of the company in detail. The transcript of Mr. McArthur's testimony was rewritten in narrative style and published in the *Pacific Power & Light Company Bulletin*, through whose courtesy it is reprinted herein.

WHEN Pacific Power & Light Company was organized in 1910 it seemed to those of us who were part of the original organization that our primary problem, after interconnecting the various separate plants, was to dispose of the company's product on a basis advantageous both to the residents of the territory and to those who had ventured their savings in the new enterprise. As a result, during the succeeding period of 25 years we have been particularly active in developing and fostering the use of every type of electric equipment that can be used to advantage in the territory we serve.

The Pacific Company, I feel, has had an outstanding record in this class of work. Consumption figures of customers in 1910 are, of course, unavailable, but today we are moving on an average of more than a hundred kilowatthours a month to all of our 36,000 residence customers, or better than 1200 kilowatthours a year. This is, roughly, about twice the average for the United States as a whole.

If I recollect correctly, in the first volume of the engineer's report some observations were made in connection with the kilowatthour uses of residence customers in the state of Washington, and with the minor exception of the property at Soap lake, the Pacific Company stood next to the top of the list, being exceeded only by The Washington Water Power Company.

We feel today that our sales problem is the greatest problem that confronts the company from an operating point of view. We are faced throughout our territory with competition that is not only potential, but is also actual, and I don't mean the competition which is popularly supposed not to exist because we have a so-called monopoly. I mean the competition for the customer's dollar. And also, if we are going to induce customers to use electric energy in our territory we must persuade them to buy electric equipment through which to use the energy, because electricity can't be turned on like water and permitted to run out of a faucet. It must run through some utilizing equipment, and throughout the entire period of our history we have been earnestly endeavoring to get customers to put better current utilizing equipment on their premises, and that includes not only residence customers but commercial customers, farm customers and industrial customers.

### Company Takes Lead

It has been, in my opinion, a matter of common knowledge that we have been in the forefront of the work of developing the uses of electricity throughout this territory, and particularly the uses of electricity on the farm. Today in the state of Washington the average consumption of electric energy on the farm is in the neighborhood of 1700 kilowatthours a year. With two exceptions this is by far the best of any state in the West. The two exceptions are California and Arizona, where, I think, the figures are considerably distorted because of the inclusion of a good deal of irrigation pumping. Under normal conditions a record of 1700 kilowatthours a year is a fine one.

Pacific Power & Light Company now serves more than 9000 farms. We have utilized every means we could to encourage the use of electricity on the farm, not through the sale on our part of load-consuming equipment, but by attempting to educate farm customers as to how they can use equipment to their own advantage, and particularly as to how they can make and use home-made equipment.

Recently I picked up one of the little circulars that we send out to our farm customers every month, and in it there is an interesting account of two or three different types of home-made electric equipment. One of these devices is an instrument for removing spots from eggs. Spotted eggs cause a serious loss to the producer. Another piece of equipment made solely from scrap material is a home-made grindstone. We don't attempt to sell these things, but we are glad to help our customers put in that type of equipment, and we wish to be of assistance to them in a practical way.

### Experimental Work Helped

In this little circular there is a discussion on a home-made electric workshop. It is produced from all sorts of scrap material salvaged from automobiles, washing machines and other similar equipment. Our whole activity in connection with our farm customers is not carried on from a merchandise standpoint, but from the point of view of attempting to get them to use more electricity on their farms. This is a time when there is a nation-wide plea that we make conditions better for farm people, and a nation-wide plea that we also have a more abundant life throughout the country by the use of more electricity.

We have attempted at all times to cooperate in every way both with the Washington State college and the Oregon State college authorities, particularly in experimental work. For instance, we have been very happy to work out problems with both of these colleges pertaining to home-made brooders. It may seem to you gentlemen that to fiddle around with a home-made brooder is a small piece of business, but, after all, we have a number of customers who can't buy tailor-made brooders. We must design something that is suitable to the

purse resources of many customers who have low purchasing power.

### Home Builder Helped

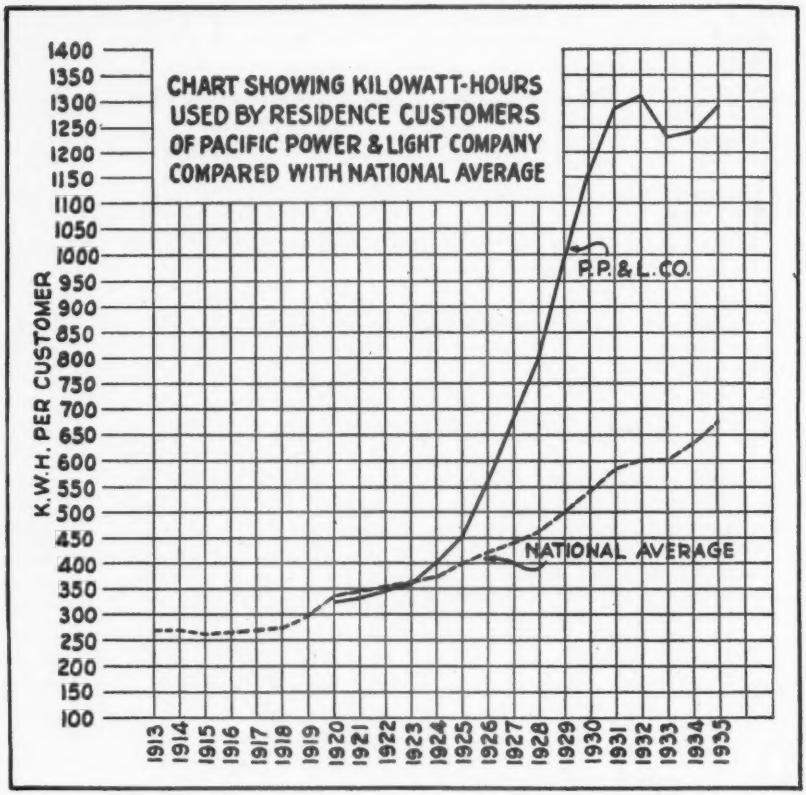
We worked diligently to get this home-made brooder developed. We made plans and blue prints and we have held many demonstrations. We have shown our customers how they can make these brooders at a minimum of expense. That is just one of the many items that we have gone into with state college authorities both in Oregon and in Washington.

The company has an agricultural agent who makes his headquarters in Walla Walla. He was previously county agent for Cowlitz county. He devotes his entire time to the development of electrical uses on the farm. Under his supervision there is a staff of farm service men, varying in size throughout the seasons of the year. There are between ten and fourteen full-time or part-time men whose business it is to visit and inspect the equipment on every farm we serve. These men don't sell merchandise. They go to the homes of these customers and ascertain whether they are having any trouble with either interior domestic equipment or with farm service equipment.

### Agents Help Farmers

There may be minor repairs or adjustments that can be carried out on the premises. Our farm service men attend to such matters as they can. Such things as attachment plugs are repaired on the premises without charge to the customer. This is just a matter of courtesy and service. They also inspect radio equipment to see whether reception is satisfactory, and they consult with the farmer about his various requirements. As you probably realize, we have a wide diversity of farm activities in the territory we serve. You might also say there are no two farmers alike.

For instance, we serve several areas in Clatsop county, where farmers raise green peas that are sold by the pound and shipped to Boston on ice. Then, there are places in Columbia county in east Washington where green peas are raised in the field and handled like wheat. They are canned in this territory and distributed throughout the country. This one vegetable will give you an example of the wide diversity of conditions with which we have to contend. We are trying to develop the uses of electrical energy and design electric equipment that will be suitable to some extent at least for all these different farmers. We believe that the more we can increase our kilowatthour output the higher we can raise our farm load factor, and also our other load factors. This will be better for all concerned, including customers and company.




### Farm Consumption High

Just now we are selling to our farm customers in excess of 2400 kilowatthours a year on an average, which is considerably higher than the average in the state of Washington, mentioned a little while ago.

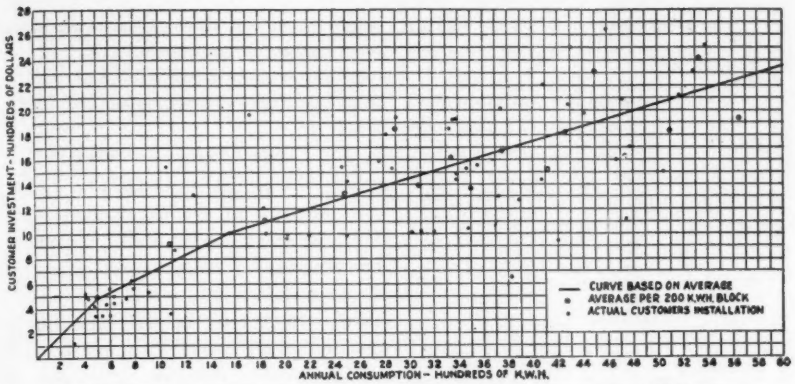
We now come to the matter of residence consumption. I should like to submit a chart showing the kilowatthours purchased by residence customers of Pacific Power & Light Company as compared with the national average. I am presenting this chart for the reason that it will show that we began an intensive campaign to develop residence load about 1922. This curve will show that beginning in 1922 and ending in 1933 we succeeded in increasing materially our kilowatthour output to residence customers. During the past three years there has been a slight defection in these figures due to economic causes, particularly in so far as they bring about more competition with the use of electricity in the home.

This curve will indicate that at the beginning of the year 1923 our average residence customer consumption was approximately 360 kilowatthours a year or 30 kilowatthours a month. Then it grew in 1924 to an average of 400 kilowatthours a year. Between 1924 and 1928, a period of four years, it grew to 800 kilowatthours a year. That is, it doubled in that period of time. In 1931 it grew to 1300 kilowatthours a year. In the year 1934 the consumption was somewhere around 1240 kilowatthours a year. By the end of 1935 we expect to have the annual average up again to something like 1250. That is compared with another line below that shows that during the period the national average grew from 370 kilowatthours in 1924 to 630 kilowatthours in 1934.

I have been asked to give some information about the relationship between the customers' investment in domestic appliances and the amount of energy that may be used by the same customers. We have some figures on this point.

### Appliance Use Stressed

A few years ago our company became very much interested in the relationship between what was necessary for a customer to invest in his own household equipment and the number of kilowatthours he used in a year. I felt at that time that that was one of the basic prob-


CUSTOMER INVESTMENT - HUNDREDS OF DOLLARS
ANNUAL CONSUMPTION - HUNDREDS OF K.W.H.
CURVE BASED ON AVERAGE
AVERAGE PER 200 K.WH. BLOCK
ACTUAL CUSTOMERS INSTALLATION

RESIDENCE CUSTOMERS INVESTMENT IN APPLIANCES AND WIRING
(This chart shows the relationship between residence customers investment in appliances and wiring and annual kilowatthour consumption.)

lems that was confronting those electrical properties which were very largely dependent upon residence service because it must be understood that the Pacific Company's industrial load is comparatively small. It bears nowhere near the high proportion in our business as it does in those companies that serve industrial areas, so we were depending upon household uses to a very much greater extent than many other properties.

We began a study of the relationship between a customer's investment on his own premises and what he could use in a year's time in the way of kilowatthours.

Our original theory was that a customer who uses, say, 1600 kilowatthours a year would have to have invested on his premises approximately $1,000 in current-consuming equipment, including various types of residence appliances and his house wiring. The line represented by the original theory would cross an annual consumption of 2800 kilowatthours by a customer who had $1,600 invested. If projected still further it would indicate that in order to secure an annual consumption of 5200 kilowatthours the customer must have $2,400 invested.

### Customer Analysis Made

After this chart was laid down we proceeded to make an analysis of about 75 typical residence customers of the company. We endeavored to get a diversity of customer types that would represent a cross section of all customers. We made an accurate appraisal of the customer's original appliance investment, including house wiring, but excluding two components. One of these components was the cost of an oil burner furnace over and above the cost of the electrical equipment of a furnace.

The other was the cost of the boiler part of an electric water heater installation. We took out the furnace itself and the boiler itself. All other electrical equipment and house wiring was included. We plotted each customer's investment in dollars at a point in the chart above that same customer's annual consumption. We then indicated as nearly as we could the mean for each one of these columns. We then struck on the chart a line curve indicating the result of connecting these mean positions.

### Consumption Basis Given

I am presenting this chart for the purpose of bringing the attention of the commission to the fact that there is a very close relationship between this annual consumption in kilowatthours and what the customer must invest, and that relationship continues on and on, just as the chart indicates. It does not indicate, and it is not intended to be representative of any particular individual. It does not indicate and it is not intended to be representative of any particular type of installation. It is a composite curve that will show, if the figures are correct, and I think they are, that if the Pacific Power & Light Company intends or hopes to double the kilowatthour uses of its residence customers during the next five years, raising the figure from approximately 1200 a year to 2400 a year, then our customers must be prepared to invest approximately $500 apiece in current-consuming equipment in order to utilize this extra electrical energy over and above what they are now using.

By no stretch of the imagination can our customers who are now using an average of 1200 kilowatthours a year hope to use 2400 kilowatthours a year unless they buy more equipment. It is true that there may be some slight increase in the use of the equipment that now is installed, but after all they can't do very much more cooking than they now do, or they can't do very much more washing than they now do on the electric ranges and water heaters they have on their premises. They can't do a great deal more lighting with their present equipment. They must branch out and get more equipment if we are to get the increased consumptions we are hoping for.

### Investment Total Large

Now, if our 36,000 customers are going to double their present uses, according to our estimates they will be required to invest $500 apiece for new equipment. That is going to require the tidy sum of about $18,000,000 to buy electrical equipment that somebody will have to use during the next five years if we are to reach the hoped for 2400 kilowatthours a year average consumption. You may discount these figures if you like, but even at a substantial discount you are going to get into a sum of money which contemplates the purchase of large quantities of electrical merchandise. The facilities must be available to furnish customers with this merchandise.

Mr. Purse has asked me what will be the types of equipment that I think will be used to bring about this increased consumption. I do not have in mind specific items. My own notion is, the result will come with a diversity of use. We can't pin all our hopes on any one particular piece of equipment. I feel that in certain parts of the territory there will be an extensive use of air conditioning. This will be particularly true east of the Cascade Range, but perhaps not so much so to the west. About 20 per cent of our customers now have electric ranges.

There is still a long way to go in the electric range business. We can't possibly get additional range customers except by the most active effort. We are up against a tremendous lot of competition. We are up against automobile competition. We are up against competition for house repairs, and we are up against a dozen and one pressures that are being made upon people's financial structures. For instance, only last year in the state of Washington one of the many surveys that was made was to investigate the living and housing conditions of a large number of rural families.

### Customer Purchasing Studied

I don't have the figures immediately before me, but in one of these surveys which was made in Yakima county a

large number of homes was visited and at each one of these homes the question was asked, "If you had $500 to spend on your premises what would you like to do with it?" Well, of course, we have been hopeful all the time that when people got $500 the first thing they would do would be to dash to town and buy an electric range and a washing machine, and then perhaps have some left over for a refrigerator. If they were thrifty we were in hopes they would have a little left to buy small appliances.

You will be surprised to know that far more than half of the people who were interrogated did not even think in terms of electrical appliances. They thought in terms of roofs, cellars and heating equipment and some of them mentioned repairs to their bathrooms. One woman even talked of having her outhouse reconstructed. That will give you some idea of the educational work that we feel is necessary even in a territory such as ours where we have gone a long, long way electrically. To me, it is apparent from the studies that we have hardly scratched the surface for the uses of electricity in the home.

Surveys were made for several counties in the state of Washington, including, I believe, Yakima and Benton. When we began to hunt for those who wanted electrical service we found that the figures were way down the line, something like one family out of twelve. Of course that is susceptible of the interpretation that Pacific Power & Light Company has done a good job, but very few people thought of spending their money for electrical equipment. I think these figures are very significant.

#### Much Improvement Possible

Mr. Laing propounds a question as to how many of our customers are fully equipped electrically at the present time. Of course no customers have premises that are completely electrified. New gadgets are being developed with considerable frequency. There is room for improvement in almost every home we serve.

In connection with our studies, I should like to suggest a word of caution about the expression "average." We use this word a little too freely. We talk about an average annual consumption of 1250 kilowatthours by our residence customer. This hardly presents a true picture, because only about 18 per cent of our customers have reached that figure or have gone above. About 82 per cent are below that figure. This shows that there is a large area in which to work to develop greater uses of electrical energy in the home and also to develop more equipment.

I should like to say in connection with our figures that back in 1922 Pacific Power & Light Company was selling about 85 per cent of all the electric merchandise that was sold in the territory we serve. The dealers were selling about 15 per cent. Last year Pacific Company sold about 25 per cent of the electrical equipment that was disposed of and dealers sold 75 per cent. Now, gentlemen, these are figures that we like to see. I can assure you that if the dealers sold ten times what we sold we would be just that much better satisfied, providing the total sales in the territory continue at a high figure.

Somebody must sell this merchandise, and to that end we have strengthened our educational efforts through advertising, solicitation, demonstrations and showrooms. Here, too, we show dealers' equipment as well as our own. We feel that it has been through the cumulative effect of many of these efforts that dealers have been able to get around to the point where they now enjoy 75 per cent of the business as compared with our 25 per cent. This is in contrast to the old days in 1922 when we sold 85 per cent of the electric merchandise.

#### Educational Stimulus Needed

We are in the merchandising business because we believe that the territory we serve needs this educational stimulus so that the average residence customer will realize the benefits he can secure by using electric energy. We know of no better way to go about it than what we are now doing.

In connection with percentages of merchandise sales that I have mentioned above, consideration must be given to the fact that in total volume there has been a great increase since 1922. I have a chart which indicates that in the year 1921 Pacific Company sold approximately $100,000 worth of electrical merchandise. In 1923 we stepped that figure up to $220,000.

In 1927 we sold about $350,000 worth of electrical merchandise and in 1929, which was a banner year in many respects, we sold over $1,000,000 worth of electric merchandise. In 1934 we sold about $340,000 worth, and the dealers sold in excess of $1,000,000 worth in our territory. This is a tremendous increase in the volume of electric appliances that has been put on our system in about a dozen years. The whole activity has been expanding on a large scale, and during this same period of time our kilowatthour sales per customer have increased from about 350 a year to a figure that approaches 1300 a year.

#### Sales Programs Described

Mr. Laing has suggested that perhaps the members of the department would be interested in Pacific Company's dealer-company cooperative sales program that we put on in 1934. It is similar in type to the campaign that we put on every year. For instance, the announcement contains statements by officers of the company giving our objectives. I wish only to read a few of the high spots. For instance, Mr. McKee says, "Our product, like any other product, must be sold and its advantages must be pointed out to the prospective customer. Therefore, in the year 1934 we will concentrate our attention on sales. * * *

"Our ultimate purpose in merchandising is to sell kilowatthours. The more appliances and equipment sold, the greater will be the sales of electric energy."

I find back in 1933 when this was prepared that I said, "Every practicable means will be employed by our company to anticipate and promote increased use of electric energy. All employees will be urged to take part by talking appliances and turning in names of prospects whom they interview."

#### Selling Job Important

Mr. Bragg made a very strong plea for the disposal of merchandise: "Selling appliances, which is a way of selling service, is not a job to be delegated to a few, but it is a willing duty of each member of our organization. The ultimate purpose is to build load on our lines and render adequate electric service to our customers."

There is one point I should like to bring out in connection with this matter and that is in part answer to the question asked by Mr. Purse, how do we expect to develop this load, or at least by what type of appliances.

That all depends on education, Mr. Purse, and I should like to call your attention to the fact that in practically no case do we sell an electric range to a customer who has not previously used what we call table cooking. In other words, he has got to go through the chairs, as you do in a lodge. The first thing he buys is a toaster and then he may buy a griddle of some sort, and then

later on a waffle iron, or a percolator, but after he gets the breakfast table loaded up with various types of electrical equipment, then he is in a mood to buy a range.

The number of people who buy ranges who haven't previously had table cooking experience is small. People just don't walk into our stores and buy a range. They go through a course of development which takes time and we are just now beginning to get the benefit of advertising and contact work that we did on our system a year and a half, or maybe two or three years ago, with certain types of customers, particularly with farmers who are very slow in making up their minds.

We have had people walk into our stores and say that they have been thinking about buying something that one of our employees had talked to them about two years ago and they just now decided to buy it.

### Much Education Needed

Well, of course, the corollary of this is that they have been saving some money in the meantime in getting ready to buy. They didn't want to buy it without having the program adequately financed. It takes a lot of education to get people to buy electric equipment.

If we are able to increase the kilowatthour consumption of our customers from 1200 to 2400 kilowatthours a year through the medium of the diversity of appliances that we believe will prevail, and at our present rates, we estimate that each residence customer will have to take on about $30 a year of increased electric service over all our territory. This is an average figure.

In order to do that these customers will have to invest about $500 each in appliances. The carrying charges, including interest, depreciation and maintenance on $500 worth of appliances is a considerable figure. Personally, I would not set it at less than 20 per cent, which means $100 a year, so that in order to use $30 more electric energy the customer must assume fixed charges of about $100 a year. We have been told repeatedly that the way to get customers to use more energy is to reduce the cost per kilowatthour. It is my opinion that that is not the only phase of the question that confronts us. Another phase is to get lower priced appliances where it is feasible to do so, and it is of the utmost importance that we be able to show our customers how they can benefit by using electric equipment.

### Customers Demand Best

Mr. Schaaf asks if reducing the cost of electric energy does not produce a good psychological effect. That is true, but there have also been some psychological benefits as the result of reducing the cost of appliances. For instance, TVA has put out a considerable amount of publicity about the so-called TVA models, which include items with lower prices. Frankly, some of these models are not very well accepted in the Pacific Northwest. They are considered to be below local standards. I do not say this as criticism in any way. I think these lower priced models are good pieces of equipment and they will serve a highly useful purpose, but it has been just a little difficult for us to sell a lift-top type refrigerator, for instance, in this territory when most people want front-door types.

Now, it is a fact that federal employees connected with the TVA gave a good deal of study to the relationship between the use of residence appliances and the building up of an electric load. The government has been active in trying to promote the sale of appliances. One of these agencies has been actively financing the sale of domestic equipment.

### TVA Costs Studied

When the TVA was organized one of the problems that confronted that part of the authority which was interested in electric power was that of building up domestic electric consumption. It was realized that the TVA is operating in an area where residence consumption was at a low figure. I don't know what the average figures were but probably below 300 kilowatthours a year.

The government organized under the laws of Delaware, and later reorganized under the laws of the District of Columbia the Electric Home and Farm Authority. The stated policy of this new authority was to bring about reasonable financing rates and sales terms for home electric equipment. Publicity was issued to foster and stimulate the sale of appliances. The whole program was entered into for the purpose of boosting the sales of electric appliances to those who had not previously used them, with the hope that the kilowatthour consumption in the TVA territory could be developed to the point where the residence business would show a substantial improvement in its load factor. TVA was greatly interested in this matter, and had a number of working arrangements with various utilities in that part of the United States.

At a later date, the Rural Electrification Administration was set up in Washington, D. C. It is apparent from an inspection of the requirements that the REA feels that rural customers must be in a position to use considerable amounts of electric energy if the extensions built by government money are to be self-sustaining. It seems that the government has given much thought to the problem of stimulating the purchase of electric appliances by residence customers.

### Ontario Plan Described

The Hydroelectric Power Commission of Ontario publishes a bulletin, and in the copy for August, 1935 is a report of a load-building committee which was appointed for the purpose of developing and fostering greater use of electricity in the home. Throughout this entire report emphasis is placed upon the necessity for better new business and commercial activities.

For instance, among the recommendations is one that appropriations be set set aside for publicity purposes. Another suggests that municipalities taking energy from the Hydroelectric Power Commission engage survey men. Individuals should be properly trained to build up a feeling of confidence and better service among hydroelectric users.

It is suggested that welfare organizations should be cooperated with and that talking pictures should be developed. Contacts should be made with vocational and high school students, and the electric industry should be mobilized to take hold of the load-building program. Hydro superintendents should be stirred up on the importance of load building.

All the way through this report there are recommendations in which with some paraphrasing you can find ideas that are essentially the same as in our own load-building programs. The activities are recommended by the Commission itself to the municipalities which purchase energy from the Commission. Specific references were made to advertising appropriations, urging that they be substantial.

In looking over this bulletin another thought occurs to me which contains an interesting example of one of the problems I have mentioned. A certain air conditioning installation is suggested at an installed cost of $275. On the Pacific Power & Light Company system this installation would have an annual power bill of about $5, so that if the

installation were made in our territory our customers would have to invest $275 if we were to get $5 worth of new revenue. The carrying charges on the cost of the installation are, of course, substantial.

I do not know the expectancy of life of this equipment, but I should say the carrying charges would not be less than $40 a year. This means that the customer's own charges would be about eight times the annual cost of the electrical energy at our rates.

### Sales Effort Essential

In my opinion it would be absolutely impossible to secure the results which the Pacific Company has secured had we not been deliberately, energetically and forcefully trying to sell appliances, not only through our own outlets, but by cooperating with dealers and helping them sell appliances.

The question is asked as to whether some customers prefer to deal with the company direct rather than with dealers. That is probably true in some cases, but we have never attempted to develop that sort of attitude among our customers.

Incidentally, it is my opinion that many of the larger appliances, including ranges, washing machines and refrigerators, are best sold on the customer's own premises. In other words, it is frequently necessary for the dealer or for the company to go to the customer rather than count upon the customer coming into the store. It is the natural impulse of most women to wish to see one of these appliances in her own home so she can see how it is going to look. There are many people who are in the status where they are interested in the purchase of something, but unless those who are selling appliances can crystalize this feeling and arouse the customer's interest there is not much chance of a sale being made.

### Field Canvass Helps

We do, of course, have people come into our stores and buy without previous solicitation, and the dealers have the same experience, but I think most sales are made as the result of an active canvass in the field. I am talking now about major appliances. Most of the smaller appliances are sold without so much solicitation.

Every now and then we have to handle the purchase of some piece of equipment as a special accommodation to the customer. This service applies to certain special items that are not easily procurable locally. We frequently have customers come into our stores and ask us to help them get equipment that can't be bought in the territory. Sometimes we even have to send out for a considerable distance. These things include items in the nature of farm equipment, rather than home appliances, but even in the latter case customers come to us and ask our cooperation to find where some specific type of equipment can be procured and if we will get it.

That service is done by our company as a matter of accommodation. We don't engage to sell, for instance, certain types of farm equipment of an unusual character and we do not stock these items, but if a man comes to us and wants our help, we will certainly cooperate with him and do what we can to get what he wants. We feel that is an obligation we owe to our customers.

### Work Mostly Promotional

In the commercial lighting end we do not undertake to handle the equipment itself. Our activities are entirely promotional. We visit the stores and showrooms in the territory we serve and demonstrate in the best way we can what may be done to improve lighting situations in the hope this will improve the business done in such stores. We are not engaged in the selling of commercial lighting equipment. If, however, some customer wants a special piece or style, we are willing to order it, but we do not hold ourselves out to be in that line of business.

Furthermore, we do not merchandise in the industrial power field but we do give people advice and attempt to get them to use more electrical energy and put in better installations. We frequently have to get a lot of information about particular services for many types of industrial enterprises.

We find that for principal uses of electrical equipment it is necessary to get in contact with our customers, including residence, farm and industrial, to study their installations. This takes the time of a number of people. We make inspections and check load conditions, voltage, radio reception and other things of that nature. We do not attempt to sell anything through the service of this class of employee.

If it is found as a result of some particular survey that a customer is actively interested in buying a certain appliance, then a salesman makes a call with the hope of selling such appliance. If the customer has already been in contact with the dealer, we call up the dealer and tell him so, and let him call the customer if he is still interested. We try not to trespass on dealer activities. If they have been on the ground first we try to see that they get the sale.

### Periodic Contacts Needed

We believe it is to the advantage of our customers to make periodic contacts with them to see whether they are utilizing service in a satisfactory manner.

In connection with our advertising activities, I should like to call your attention to sets of copy pertaining to various classes of merchandising. Throughout this advertising it will be observed that a great deal of emphasis is placed upon the statement, "See any dealer in electrical equipment or Pacific Power & Light Company." In many of these advertisements the line about the dealer is placed above the name Pacific Power & Light Company.

You may be interested in one of the advertisements for electric water heaters. No particular type of equipment is mentioned. In fact, the emphasis in the advertisement is placed upon service rather than on the installation. You will observe in most of our advertising that the wording is general and is so arranged that it can be capitalized on by any dealer in electrical equipment in our territory.

We are trying to promote the general acceptance of the use of electricity in the home rather than any particular make of equipment. It is through this means that we have been able to get the cooperation of dealers in our territory so that they are now selling more than $3 worth of equipment to every $1 that we sell.

### Kansas Experience Given

You may remember that a few years ago a bill was passed in Kansas to prohibit utilities from selling appliances. There was a tremendous falling off in the amount of merchandise purchased in the state. Manufacturers found they could not secure the type of outlets they had previously secured in Kansas because the demand was not there. There was nobody to keep the pot boiling.

The dealers worked hard at the job but they were not well organized and needed the instrumentality of the utilities to provide a nucleus around which the dealers could gather. The law was subsequently held unconstitutional. The utilities have gone back into the merchan-

dise business and I think the dealers are satisfied that if the utilities are not in the merchandise business there will be a let-up in the demand for household equipment.

It is necessary to keep our merchandise program at a high degree of activity if we are to secure the essential load building. I feel that it is so vitally important that I can't emphasize too strongly the necessity for the company to remain in this type of load building program.

There are many new developments coming on. For instance, during the past few years there has been dissatisfaction in respect of home lighting equipment. Two or three years ago the Illuminating Engineering Society undertook to develop new types of portable lamps. These are now called student lamps, although I think the name is a misnomer because the lamps are suitable for all types of home use, and even office use. An investigation developed the fact that more than 40 per cent of the students in some of the larger colleges in the country had defective vision, and more than 20 per cent of large groups of grade school students also had defective sight. Many of these students did not know they were handicapped. A large part of the trouble was attributable to poor home illumination.

### Lighting Work Praised

The I. E. S. lamps were put on the market about two years ago, and they have been extensively advertised. To my way of thinking, this is one of the most important developments that has yet come about in connection with the use of electricity in the home. It is an attempt to modernize lighting.

These lamps are made contrary to many of the preconceived ideas about portable lamps. It used to be felt that lamps should be as low as six or eight inches from the table, but the new lamps are much higher, more nearly about two feet above the table. They look strange at first, but, in my judgment, are greatly superior.

The success of these lamps has been remarkable. Nevertheless, we have had to do a great deal of advertising to get people to familiarize themselves with this new equipment.

When we reach a situation where 40 per cent of the students of the universities have defective vision, the matter is serious. If 40 per cent of the students were lame and hobbled about because of badly fitting shoes, somebody would do something about it. We are not so keenly aware of defective vision because the actual physical disability frequently is not apparent. Many people do not know just how deficient their vision really is.

### New Lamps Shown

Here is something that the lighting industry is trying to do in the way of concrete help to thousands of people who have poor vision. We have advertised the new lamps quite fully in our territory, and we are including all the dealers in our advertising. We are attempting to develop a cooperative plan under which these I. E. S. lamps should achieve some of the success in this part of the country that they deserve.

You can look around this room and see, for instance, some of the problems involved in connection with our attempt to improve illuminating conditions. The chandelier which hangs above our heads is what we might call a centipede type. This old chandelier violates practically every principle that is associated with good illuminating practice.

All over our territory we have problems with this class of equipment and we have worked on these problems. There is no merchandise profit to us because we do not sell this class of merchandise. We do, however, call at peoples' homes and offices and give them counsel and advice as to how they can eliminate eye strain, and how they can get rid of some of these old centipede types and badly designed wall brackets, as well as other fixtures that are causing a great deal of unnecessary eye trouble.

I have been asked if it is not true that these changes frequently contribute to the use of a greater amount of electricity for illumination. That is true, generally speaking. The improvement in the style and type of light frequently includes larger lamps, and improved lighting fixtures may also mean longer use of the new equipment. Some of the old equipment tired peoples eyes after short use, and with better lighting equipment they can work or read over longer periods of time.

### Rates One Factor

I have been asked by Mr. Lordan the exact significance of relationship between Pacific Power & Light Company's average low rates per kilowatthour and high residence consumption. In other words, has this increase in consumption come about because we have been lowering our rates steadily over a considerable period of time? I think this is a significant question.

Undoubtedly, lower rates have caused increased consumption, but it should also be borne in mind that the reduction in cost per kilowatthour to the average resident has also come about by greater use. With greater use, customers get on to lower steps in our rates. They reach higher load factors. I think that lower rates are one of the important factors that go to make up an increase in consumption, but I think that there are several other important factors.

I don't think that rates are the only factor, and I don't think they are the most important. Obviously they are not the most important in the case of the man who must invest $275 for a piece of air conditioning apparatus that uses $5.00 worth of energy a year.

In the State of Washington there are only two companies, according to Mr. Carey's letter of transmittal, that have a higher annual residence kilowatthour consumption than we have, and one of these companies is very small. Some other large companies have lower rates than the Pacific Company, but it should be noted that of all the companies that have lower rates, only one large company has a higher annual consumption. It must be apparent that while rates are a factor, they are not the only factor.

### Advertising Program Vital

Even if we were not engaged in the sale of appliances, I think that substantially all of our advertising program would have to be carried on. It has been my experience that those central stations which do not sell merchandise, nevertheless, advertise widely. They also do a great deal of demonstration work.

I was recently in California and I was impressed by the heavy advertising being done by one of the large utilities, which does not merchandise extensively. It is apparent that it is using every means it can to popularize the use of home equipment, notwithstanding the fact that it sells but little.

If we did not sell a nickel's worth of merchandise in our territory, we would still be required, in my opinion, to do the things that we have been doing over these twenty-five years to get people that live in the territory to use more electricity in the home. That is what we are trying to get them to do, and the fact that we are in the merchandise business is incidental to the result that we are trying to accomplish.

It is a fact that the Company's rate schedules, almost from the very beginning of its history, have been designed in

such form that the greater the consumption by the customer, the lower will be his cost per kilowatthour. As he increases his use, down comes his average rate. Our problem, as far as the cost of a kilowatthour is concerned, is to get the customer to use a larger volume of electricity. If he will do this, automatically his average costs will come down.

### Rates, Use Linked

If the customer does not have the equipment he will not get off the primary steps. He must be prevailed upon to buy equipment, the use of which will bring him into the low steps of the rate. We believe that our rates are adequately designed to help bring about low average costs per kilowatthour.

The question has arisen as to whether any of the government regulatory officials are thinking in terms of the cost of customer's appliances. I have before me a paper entitled "The Effect of the High Cost of Wiring in Appliances on the Use of Electrical Energy," by J. C. Damon, Chief Engineer of the Public Service Commission of Wisconsin. This discussion was presented at the Thirteenth Annual Conference of Utility Commission Engineers at the Bureau of Standards in Washington, June 6, 1935. To me this is a most interesting and instructive document because it has a very close relationship to the curve that was submitted in evidence.

On page two there are some figures that are particularly significant because they have a bearing on one of the so-called systems of bargain rate schedules which I believe have been put into effect in several states. Whether in Wisconsin or not, I do not know.

Even had some of the consumptions not been made on bargain rates, and assuming that they might have been made on the normal rates as shown in this publication, about four cents a kilowatthour, it is apparent that the cost of operation of many of these appliances, which Mr. Damon lists, is insignificant as compared to the total installation costs.

### Appliance Investment Studied

For instance, he has made studies of the installations in electrified homes, and without including the house wiring, he finds that the minor appliance investments run all the way from $175 to $633, or an average of about $251 for the houses that he studied. When he made an inventory of the larger appliances, investments were found to be all

(*Continued on page* 404)

## SALES—ELECTRIC REFRIGERATORS

(*Household Models Only*)

MONTH OF JULY AND FIRST SEVEN MONTHS OF 1936-35

| | Month of July 1936 | Month of July 1935 | Month of June 1936 | First Seven Months 1936 | First Seven Months 1935 |
|---|---|---|---|---|---|
| *Total United States* | 205,098 | 154,227 | 237,371 | 1,646,657 | 1,259,700 |
| Maine | 151 | 1,004 | 1,321 | 6,622 | 6,963 |
| New Hampshire | (46) | 637 | 754 | 5,623 | 4,936 |
| Vermont | 449 | 463 | 679 | 4,144 | 3,082 |
| Massachusetts | 6,092 | 6,673 | 8,725 | 63,217 | 51,753 |
| Rhode Island | 403 | 809 | 931 | 8,008 | 6,580 |
| Connecticut | 4,632 | 3,109 | 3,465 | 28,412 | 19,225 |
| *Total New England* | 11,681 | 12,695 | 15,875 | 116,026 | 92,539 |
| New York | 22,667 | 20,577 | 24,955 | 174,230 | 136,051 |
| New Jersey | 6,937 | 6,717 | 8,954 | 68,513 | 54,588 |
| Pennsylvania | 19,241 | 12,932 | 22,099 | 151,207 | 101,123 |
| *Total Middle Atlantic* | 48,845 | 40,226 | 56,008 | 393,950 | 291,762 |
| Ohio | 14,582 | 10,002 | 17,208 | 108,901 | 78,353 |
| Indiana | 6,774 | 4,401 | 6,531 | 47,946 | 33,469 |
| Illinois | 17,746 | 10,670 | 16,663 | 126,340 | 94,788 |
| Michigan | 10,536 | 5,540 | 11,413 | 81,244 | 52,554 |
| Wisconsin | 2,722 | 2,273 | 3,542 | 28,683 | 21,305 |
| *Total East North Central* | 52,360 | 32,886 | 55,357 | 393,114 | 280,469 |
| Minnesota | 3,835 | 2,743 | 3,195 | 23,731 | 19,904 |
| Iowa | 3,856 | 2,308 | 3,411 | 26,987 | 22,369 |
| Missouri | 6,613 | 4,496 | 7,155 | 53,122 | 41,152 |
| North Dakota | (124) | 400 | 360 | 2,805 | 3,680 |
| South Dakota | 425 | 564 | 784 | 4,683 | 4,726 |
| Nebraska | 1,584 | 1,491 | 2,212 | 15,438 | 15,235 |
| Kansas | 2,045 | 1,892 | 3,119 | 20,440 | 17,775 |
| *Total West North Central* | 18,234 | 13,894 | 20,236 | 147,206 | 124,841 |
| Delaware | 555 | 340 | 398 | 3,261 | 2,942 |
| Maryland | 945 | 1,991 | 2,068 | 17,881 | 19,057 |
| District of Columbia | 3,463 | 1,309 | 2,215 | 15,891 | 10,267 |
| Virginia | 3,002 | 2,329 | 3,354 | 26,280 | 20,049 |
| West Virginia | 2,441 | 1,777 | 3,237 | 22,727 | 14,409 |
| North Carolina | 3,068 | 1,900 | 5,075 | 33,311 | 24,559 |
| South Carolina | 1,620 | 1,442 | 1,995 | 15,708 | 11,842 |
| Georgia | 3,025 | 3,251 | 5,771 | 29,256 | 25,007 |
| Florida | 3,689 | 2,419 | 2,491 | 18,487 | 18,107 |
| *Total South Atlantic* | 21,808 | 16,758 | 26,604 | 182,802 | 146,239 |
| Kentucky | 2,860 | 1,858 | 3,733 | 22,888 | 15,319 |
| Tennessee | 1,632 | 2,169 | 4,477 | 25,790 | 22,323 |
| Alabama | 2,264 | 1,619 | 2,697 | 19,207 | 20,635 |
| Mississippi | 1,029 | 670 | 1,334 | 9,252 | 6,541 |
| *Total East South Central* | 7,785 | 6,316 | 12,241 | 77,137 | 64,818 |
| Arkansas | 440 | 911 | 1,660 | 10,240 | 9,359 |
| Louisiana | 2,000 | 1,399 | 2,184 | 17,169 | 12,938 |
| Oklahoma | 1,412 | 1,466 | 1,691 | 17,495 | 16,181 |
| Texas | 8,164 | 5,101 | 11,137 | 68,067 | 56,128 |
| *Total West South Central* | 12,016 | 8,877 | 16,672 | 112,971 | 94,606 |
| Montana | 1,333 | 826 | 1,453 | 7,971 | 5,580 |
| Idaho | 1,227 | 716 | 1,323 | 8,585 | 6,470 |
| Wyoming | 660 | 318 | 448 | 2,734 | 2,214 |
| Colorado | 1,186 | 1,563 | 2,184 | 12,331 | 10,785 |
| New Mexico | 193 | 326 | 595 | 3,392 | 3,273 |
| Arizona | 162 | 410 | 719 | 5,521 | 5,327 |
| Utah | 1,062 | 523 | 1,726 | 10,348 | 6,864 |
| Nevada | 451 | 262 | 355 | 2,274 | 1,621 |
| *Total Mountain* | 6,274 | 4,944 | 8,803 | 53,156 | 42,134 |
| Washington | 3,564 | 1,967 | 4,838 | 27,505 | 18,598 |
| Oregon | 1,885 | 1,656 | 2,530 | 17,814 | 13,131 |
| California | 20,646 | 14,008 | 18,207 | 124,976 | 90,563 |
| *Total Pacific* | 26,095 | 17,631 | 25,575 | 170,295 | 122,292 |

(Figures based on report issued by the National Electrical Manufacturers' Association.)

# The Bewildered American

**By W. C. Mullendore**

*Executive Vice-President, Southern California Edison Company*

THE word "bewildered" is defined as synonymous with "lost," "confused," "confounded," "mystified," "dazed" and "puzzled." In choosing as my subject "The Bewildered American" I had in mind that these words are descriptive of the state of mind of most of us in the midst of the mystifying maze of ideas, half-baked and otherwise, with which the air is filled today. Political history reveals that in all periods of such unsettlement and maladjustment as the present, the soothsayers and medicine-men flourish and it is comparatively easy for each of them temporarily to attract a following. It is difficult to believe, however, that any past similar period could rival this one, particularly with respect to the numerous and diversified attempts to make a mystery out of our economic and social problems. Throughout the world there seems to be a determination to turn away from the old realities and to attempt to explain our troubles as due to anything and everything except a violation of comparatively simple, old and tried, economic laws.

In his famous reply to Senator Hayne, Daniel Webster began his speech with these words:

"When the mariner has been tossed for many days, in thick weather and on an unknown sea, he naturally avails himself of the first pause in the storm, the earliest glance of the sun, to take his latitude and ascertain how far the elements have driven him from his true course. Let us imitate this prudence, and, before we float further on the waves of this debate, refer to the point from which we departed, that we may at least be able to conjecture where we now are."

### What Caused Our Troubles?

It may be that it would also be prudent for us as American citizens, at a time when we have been driven from our course by the storms of debate and find ourselves lost in the haze of these many confusing and conflicting theories, to refer again to the point from which we departed. It is just possible that we are attempting to make too much of a mystery out of our situation. Proceeding upon that assumption, I am going to ask you to permit me to revert to a question which may seem to be very old and very hackneyed, namely, "What caused

MR. MULLENDORE

the depression?" or "What caused this economic and social maladjustment from which we seem to be suffering?" As tired as we may be of the subject, it nevertheless remains true that until we have made up our minds as to the cause of our troubles we cannot arrive at an intelligent conclusion as to the validity of particular remedies offered. There certainly is no unanimity of opinion at the present time upon the diagnosis of our economic illness and until we have agreed upon a diagnosis the remedies must be of an experimental character.

Let us therefore hastily review what has happened to us in this century, in order to see whether the difficulties in which we now find ourselves can be explained as a result not of some mysterious or hitherto undiscovered malady but of a complication of some very old and persistent ills to which man in his economic activities has long been subject. During the first fourteen years we seem to have been making progress. True, we had some interruptions, such as the panic of 1907 and the slow period in 1913 and 1914. We were even then complaining about the rising cost of living, but as we look back now we are quite willing to accept the year 1913 as a standard both as to costs of living and prices for many products. We are not, of course, willing to accept that year as standard for the number of automobiles or radios or picture shows, or many other things we then did not have but which we now consider necessities. Nevertheless, we feel that generally there was a better balance in our economic life, less maladjustment between groups, more certainty and less confusion than now.

In 1914 there came the first great explosion—and for more than four years there raged in the civilized world the most violent, terrific and destructive war thus far in history. It was a war resulting from the clash of national ambitions and hatreds mixed in the stewing cauldron of European diplomacy and intrigue. Into it we were finally drawn, and upon its ignoble altar there were sacrificed the lives of some seven million of the young men of the civilized world, together with much of the wealth accumulated over decades by the work of entire nations. Of equal importance and evil portent, there was loosed a flood of human hatred resulting from twisted and distorted lives, frustrated ambitions and aspirations, national and individual, the ugly currents of which hatred still engulf the world from Occident to Orient. Other effects of the war, from which we still suffer, were the disruption of international boundaries and the creation of new currents of commerce, the overstimulation of certain industries, and the continuing struggle of many nations to become more self-contained; all of which means interference with the hitherto established and natural flow of commerce between nations.

Here in the United States in the decade immediately following the cessation of the armed conflict of the World War we were carried along by some of the currents flowing from the war, largely unconscious of the forces with which we were dealing. The vacuum created by the destruction of the war created a false demand for our goods and services. Great inventions and developments such as the automobile and radio, added to the impetus of this post-war demand from Europe, resulted in an explosive

advance in our industrial and commercial life. To the dislocations and maladjustments created by the war, there were thus added those which inevitably flowed from this unprecedented activity in the decade following the war.

A people which, a generation before, had lived under an economy which was predominantly agricultural, were suddenly thrust into this new world which was being fashioned by forces of international trade and industrial developments so new and so powerful that we could neither measure their strength nor their ultimate effect upon our individual or common life.

### "The Cost of High Living"

Accompanying this changed external world, and largely as a result of the same forces, we were rapidly carried away from our moorings and guideposts in the ordering of our individual lives. The excitement and movement of the war here again was followed by the rapidly changing standards of living following the war. The new and irresistible devices which were offered to us in the form of automobiles and radios and the amusement afforded by motion pictures and other new forms of amusement, our national experiment with prohibition, the improvements in communication, and a thousand other changes major and minor, brought us into closer contact, made us more dependent upon the services of others, and revolutionized the way of life for most of us. While these things enriched our lives in a material way, they also made life vastly more complicated, and, by contrast with the simpler days, the mere ordering of individual and family life became a much greater problem. As someone said, we were troubled not so much by the high cost of living as by the cost of high living.

Millions of people became convinced that the old laws of thrift, and the rule that one could not indefinitely spend more than he earned, were outmoded. The expansion of credit and installment selling facilitated our acquisition of these attractive new devices and our enjoyment of these new amusements. We soon forgot the horse and buggy days and the simpler life of the past generation, and resented the old distinction between necessities and luxuries. Indeed, to millions of us the new luxuries became more important than the old necessities. The theory that in the new era we had outgrown the old-fashioned laws and rules which were formerly accepted as guides and standards in our activities in our individual daily lives was embraced, because such a theory so accorded with our ardent desire. As a people we both ignored and silenced by ridicule the old fogies who dared to try to throw a wet blanket upon our joyride by warning that unbalanced budgets, mounting debts and increasing taxes were still dangerous and to be avoided. We had learned that the way to make money was to go into debt, to make use of the abundant credit then available, and that the way to enjoy life was not to save but to spend. Indeed, our disrespect for the older guides and laws was not limited to material and economic affairs. There was at the same time a growing indifference and skepticism in our religious and moral or spiritual life.

There came a day of reckoning. The demand from foreign countries for our goods went into a sudden slump when we stopped providing them with the credit with which to make their purchases, and when we had rebuilt with our methods and machinery some of their productive facilities. The cessation of that demand meant a serious slowing down in our activity; the paper profits made in the stock market were wiped out overnight, and overnight many of us felt less well-to-do than we had the day before. Now debts began to assert themselves again in the old-fashioned way as troublesome obligations rather than as blessings. Our deficits were no longer disguised, and, with their disguise off, they presented a less pleasing appearance. I need not review the story further; it is sufficiently recent to be fresh in all our minds.

### Whom Shall We Blame?

Now we can return to our first question: What was the cause of our trouble? Whose fault was it? That involves further questions: Did we go to excess in certain lines of activities? Was our trouble in any degree the aftermath of the great war? If so, then to place the blame we would have to determine what caused the war, and who got us into it. We would have to ask not only who loaned money to foreign countries after the war, but who wanted to and who did sell our goods to foreign countries upon the basis of the credit thus created. Who was it that lived beyond their means and overextended their credit? Who bought and sold in the stock market? Who speculated? Who bought and who sold automobiles that we could not afford? Who built and who patronized the surplus number of motion-picture palaces? Who started the miniature-golf craze and similar stunts? Who built the extravagant country clubs, and golf courses, and the beach clubs and mountain clubs, and hunting clubs, and women's clubs, the resplendent big hotels and palatial office buildings, etc., and so on? Who urged the enormous expenditures on roads and schools, and public buildings, and parks and playgrounds, and who benefited from these things? Who raised our taxes and created our public debts? Who patronized the bootlegger, and allowed the rackets to grow which sprang up in that dizzy era?

On the one hand we have a group who are shouting that the cause of our troubles is to be found not in the mistakes of all of us, or of the many, but of the few. This group tells us that the true culprits are the representatives of something called "entrenched greed," sometimes designated as "money changers in the temple." They seem to visualize a small group of cunning and deceitful men, hidden away in the "Wall Streets" of the country, plotting our downfall, and indifferent to human suffering.

Many of those who believe with this group that the machinations of the few caused the depression go still further. They assert that the social and economic system which formerly obtained in the United States, sometimes designated as individualism, inevitably results in the concentration of wealth and power in the hands of a few who will inevitably use their power to bring about ruinous conditions for the mass of the people. They profess to believe that under this system, which they usually refer to as rampant capitalism or rugged individualism, the poor get poorer and the rich get richer until the mass of the people are no longer able to buy the products of the mines, farms and factories; that this is the true explanation of our last crash, and that similar disasters will occur as long as the system continues. Hence, they say, the evils from which we suffer are inherent in the system itself. It is a system, they contend, which brings about poverty in the midst of plenty, because it breeds monopoly control of the goods and services which are produced, and monopoly in its endeavor to continuously exact profits finally "bleeds the people white." Trade can no longer go on because the people have

been drained of their purchasing power by the greed for profits.

This argument is attractive for at least two reasons: First, it is comparatively simple and easy to understand, and in the elaboration of it the proponents are able to point to many examples of men who have grown rich while thousands live in tenements and on farms under conditions near poverty. Second, it is attractive because it places the blame on the few who can be personalized as the Mellons, Morgans and Rockefellers, while it excuses the many on the ground that they have suffered "through no fault of their own." In short, this theory provides a scapegoat for people who are suffering from misfortune, and enables them to blame others for their troubles. It is a human trait to desire to fix the blame on others when we suffer reverses.

**Freedom Means Individual Responsibility**

Now, as against this theory of the cause of our troubles, those who come to the defense of individualism may make an argument along these lines: The cause of our difficulties is not to be found in the system but in our failure to observe the laws of the system. Individualism grants a large measure of freedom to the individual. But along with this freedom goes a large degree of responsibility. If one is free to exercise his judgment as to what he should do and as to how he shall order his life, he must also accept responsibility for his mistakes of judgment. In short, the system of individualism is a system of individual responsibility.

This individualist argues that the mistaken actions and judgments which resulted in the depression were due not alone to the mistakes of the few but also to the excesses in which practically all of us had some part. They argue that the buyer as well as the seller had some responsibility in transactions in which the buyer overbought; that the individual who overestimated his capacity to pay and overextended his personal credit cannot place all the blame upon the seller or lender. They point out that the millions who speculated in the stock market, in city real estate, in farm land and in commodities were not forced to speculate, but did so because they hoped to gain thereby, and that this hope was aroused not alone by evil promoters, but also by the rosy optimism and unbounded enthusiasm of millions of honest and well-meaning citizens who cheered each other on and resented all warnings of dangers ahead. They believe that if entertainment, amusement and the devices which contribute to our higher standard of living were sold to excess, this was because there was a demand for them on the part of buyers whose judgment at the time of purchase told them they could afford to buy. They even dare to point out that the selling group alone includes a large section of the population of these United States, and that high-pressure salesmanship and appealing advertising was not confined to a few designing rich men. They call attention to the fact that even the public expenditures which resulted in higher taxes and big public debts must have been authorized by people elected to office by the votes of a majority of those who voted, and who did what they thought would please their constituents. Upon the basis of these facts, it is concluded that most all of us had some part in this joyride which ended with its participants somewhat less exuberant than they were as they merrily rolled along.

Pursuing this line of argument a little further, those who defend and would maintain the former American system, maintain that there are certain laws which must be observed if it is to work satisfactorily; that there is always the risk that these laws will be temporarily ignored by some, with resultant penalties, but that such risks are the price of liberty. The system has its speed limits, its danger signals, and there are bad places in the highway along which it travels. In other words, it is not fool proof. Neither does it warrant safe delivery into the haven of happiness. It is well to remember that those old individualists who wrote the Declaration of Independence did not contend that man was by Nature endowed with the right to life, liberty and happiness; but with the right to life, liberty and the *pursuit* of happiness. Why did they use that phrase "pursuit of happiness"? Might it not be that they would have replied: The individual has the right to freedom in the pursuit of happiness, but if in that pursuit he is foolish and negligently or wilfully refuses to obey the laws of industry and thrift and other guideposts, Nature did not endow us with an unconditional guaranty that we will attain the happiness which we are pursuing.

**Planned Economy—the Real Issue**

Now in all this discussion it is apparent that there is one overshadowing, fundamental issue—one issue which goes far deeper than such subordinate questions as monetary and banking theories, taxation systems or different schemes for providing relief. This issue is as to the proper function of Government. Those who believe that the machinations of a few designing men brought on the depression believe that the remedy lies in empowering Government to direct and control the economic activities of its citizens. They would thus guard against the danger that economic power will be misused by citizens by the simple expedient of denying them any portion of such power except as they may act through the agency of their government. This theory is often designated as "Planned Economy" — meaning an economy planned and directed by Government. Those who oppose this remedy still profess to believe in the superiority of the older American system and the so-called natural laws of competition and retain their faith in such economic regulators as the law of supply and demand. To which their opponents reply that these old laws will no longer work in a complicated modern industrial civilization. Thus the big issue is joined and these questions arise: Shall we now enlarge the functions of Government to include both the control and direction of the economic activities of its citizens? Is the system of individual responsibility, with its attendant freedom of the individual to take risks and make mistakes, unsafe and unsound? Will the public interest, the general welfare and social progress be better served by a system under which the individual is the servant of the state?

This is no false, remote or theoretical issue. These are living, present and very pressing questions,—questions which we must answer in the near future and as to the meaning of which we should not remain bewildered or confused. Neither was this issue created solely by the present Administration in Washington. It has its origin farther back in our history than the year 1933. Contributions to the advancement of the issue have been made by acts of both Democratic and Republican Administrations which preceded the New Deal. True, it has been greatly accelerated in the past three years, but the struggle between these two radically opposed philosophies of Government has been growing in intensity for years. The issue may have been brought to a head by the New Deal, but the New Deal can be given neither the credit nor discredit for having created it.

Thus far it is not clear which road the American people desire to take. As

a people we have gone first in one direction and then in another, and much of the time just around in a circle with apparent loss of sense of direction. Sometimes we seem to say we do not want the Government running our affairs, and then we proceed to ask the enactment of laws governing our competitor in business. We say we do not believe we can spend ourselves rich; that taxes are too high; and that Government is spending money on many useless buildings and projects. Then we send a telegram to our Congressman and petition the President for a new post-office building, a new city hall, new roads, new sewers,—new anything so long as the Government is going to spend money in our locality. We say we do not believe in Government in business and we are in favor of fair competition; yet the same groups who express those sentiments often support the establishment of tax-free industries subsidized from the public treasury which compete with local industries financed by the savings of their neighbors. We say there is too much money being spent on relief and that relief should be handled locally; then we send a delegation to Washington to ask for a larger allotment for local relief. We say we do not believe Government should be in the business of lending money, but when a law which authorizes the use of Government credit, or loans guaranteed by Government, is about to expire, we join in petitions for the extension of that law, because we have been gaining some temporary advantage by its use. Why this inconsistency? Why this bewildering confusion? Is it not because we have no clear conviction on the basic question which confronts us, which, I repeat, is whether we shall look to Government or to ourselves for the way out?

### The Meaning of Government Control

This much should be clear: When we turn to Government we surrender a portion of our liberty and freedom in exchange for every bit of help which we receive from that source. If Government is to be our guardian, then we must be prepared to accept the position of wards to the extent that we ask Government leadership. When we seek and obtain loans from Government, the agents of Government demand an inspection of and supervision over our affairs in seeing that loan is repaid. When Government becomes a partner in our business institutions, it properly demands a voice in their management. When we ask for the expenditure of Government money, Government insists that its agents shall supervise the expenditure. Thus we add to the investigation and inspection of the Government as tax collector, the further intimacy of the Government spender.

There are those who say that we have already so far departed from the older system of individual responsibility, that we are already so dependent upon Government aid and leadership that it is impossible to return; that while it might have been better not to have started down the road of Government guardianship, here we are. Admitting that this conclusion can be supported by a number of arguments, admitting that it is very difficult to see our way to the reestablishment of the old sense of individual responsibility and to pry ourselves loose from Government aid, let us not shut our eyes to the meaning of such a conclusion. We cannot for long stand in the middle of the stream; we cannot continue to go around in circles. We must soon proceed definitely in one direction or the other. The currents are now taking us toward Government control, and we must be carried further and further in that direction or turn back before it is too late, if indeed it is not now too late.

Above all, if we are going to choose Government control and planning of our lives, let us do it deliberately and advisedly instead of stumbling blindly along under the impression that we are making no serious changes in the conditions under which we live. Let us not shrink from facing these realities: If we choose Government control we are admitting individual failure. We are asking Government to direct our lives, to tell us what to do and how to do it, because we admit life has become too complicated for us. We are saying we no longer want freedom because the responsibilities of freedom are too much for us. We are asking for a boss because we are tired of self-reliance. Let us remember too that in placing our destiny in the hands of Government, we are turning not to supermen but to others who are simply human beings like ourselves, endowed with the same kind of intelligence, subject to the same emotions and the same weaknesses. Neither should we fool ourselves into thinking that we escape the danger of domination by a small group by turning to Government control, because Government control must be exercised by a comparatively small group, and that group must be chosen through political methods. Those methods often have been demonstrated to be far less satisfactory in providing competent leadership than are the methods of competition in the business world.

### We Must Choose

Again, allow me to emphasize this proposition: We must choose between these two systems. They will not mix. They are like fire and water. One extinguishes the other. We may have a system wherein business activities are conducted by free citizens acting on their own initiative and responsibility. Under this system, the individual pays the economic penalty for violating economic laws. The function of Government, under such a system, is to enforce and maintain law and order, to protect the life, safety, liberty and property of the people. As industrial and social activities become more complicated under such a system because of modern methods of communication and other new instrumentalities used for carrying on their daily lives by citizens, there will of necessity be an extension and alteration of laws to enable Government to carry out its functions of protection and regulation. But under this system Government must remain an umpire and not become an active participant in economic activities in competition with its citizens. On the other hand, we may have a system in which Government both directs and controls the economic life of the nation. The individual is relieved from the perils of his own mistakes in economic matters by the simple process of denying him freedom to exercise his judgment. Under such a system, Government agents determine what shall be produced and how that which is produced shall be distributed; Government not only coins money and regulates the value thereof, but Government creates credit and directs the use thereof; Government owns and manages the banking system and with these powers, coupled with unlimited taxing power, control over the daily affairs of its citizens becomes absolute and complete. Now, the point is that we may have one system or the other. We cannot have both. When Government enters the economic field, private initiative begins to vanish and, sooner or later, the entire field is inevitably occupied exclusively by Government. When Government is vested with and accepts responsibility for individual welfare, individual self-reliance abdicates. When the incentive of opportu-

nity for reward and profit to the individual for his effort is destroyed, the only substitute which will produce the requisite work and effort is the fear and threat of the lash of punishment in some form by Government.

Such is a bald statement of realities of the alternative courses which are offered today for our choice. There lie the two roads. Which will we choose? Right now, at this moment, we are in the process of determining this all-important and vital question, not only for our own generation but for generations yet to come.

**Shall We Think or "Emote"?**

Finally, the wisdom of our choice will depend much upon whether we reach our decision through the use of our intelligence or our emotions. Much, too, will depend upon whether we realize the immeasurable importance of the issue. If we continue in that confused, dazed and bewildered state of mind, which looks upon these questions as mere minor annoyances and side issues,—mere political irritations having little bearing on the problem of making a living,—a decision will be made but it will not be of our choosing. If we feel that this is too big or too small a problem to worry our heads about, then others who do know their objective, who realize its importance and who think they know what is best for all of us will decide for all of us. We may not like their answer, but when we find out we do not like it, we may find also that it is too late to do anything about it.

It is a hallowed custom amongst public speakers to express great faith in the common sense of the American people. I would not violate that custom, because I too have faith in that common sense. But that faith is justified only when the common sense of the people is employed and used by them in the solution of their problems. Common sense is, after all, only another term for judgment, and, as has been sagely observed, "A man's judgment is no better than his information." If the people are wrongly informed, if their judgment is warped and distorted by overpowering appeals to their emotions, their common sense may have no chance to function.

It is unfortunately true that most of the arguments which fill the air today are directed not to the common sense and calm judgment of the people but to the emotions. The demagogue who seeks a following knows that it is much easier to win his audience by arousing their emotions of envy, jealousy and hatred than by appealing to their intelligence. A Russian writer has put the case well in saying:

"Love, friendship, respect, do not unite people as much as a common hatred for something."

The crucifixion was the culmination of a campaign of hatred—a hatred and bitterness aroused because His message to mankind was unacceptable to those who forced His crucifixion. He inveighed against hypocrisy in high places; He pleaded for the establishment of a kingdom on earth in which humbleness and kindness should prevail. Those who feared His teachings resorted to a campaign of hatred because they knew that when minds are inflamed by hatred reason is dethroned and men can be led to destroy even one who offers them salvation.

The fires of hatred are today being lighted throughout our beloved country. Our people are being told that they have been wronged. They are told by some who occupy important posts of leadership that the source of their wrongs are the institutions which have thus far preserved our freedom. This American freedom has made it possible for us to develop here a civilization which has brought a more just distribution of wealth, a broader spread of social advancement and a higher promotion of the common welfare than has been achieved at any time at any place in all human history.

If this America with its institutions is to be preserved against the onslaught of the destructive theories and the class hatreds imported from the old world, it is high time for all who are capable of straight-thinking and courageous action and calm judgment to bestir themselves and to recover from their bewilderment. Such is the challenge with which we are faced. In facing this challenge let us keep ever in mind that the question is not whether our older American system was perfect, but whether it was more nearly perfect than the alternative which is offered. All normal, right-minded men and women desire to promote social progress and advance the general welfare,—desire to see conditions so improved that their children and generations yet to come will enjoy greater opportunities for full and free development than we have enjoyed. But before we approve great and fundamental changes having such improvement as their proclaimed objective, we have the right to demand that those who advocate such changes shall convince us that they know whereof they speak. Eternal vigilance remains the price of liberty and the lessons of experience are still our safest guide.

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## Pennsylvania Electric Association Convention

THE 29th Annual Convention of the Pennsylvania Electric Association, held at Bedford Springs, Pa., September 9-11 was unusually successful, drawing an attendance that filled all the hotels at Bedford.

A. J. Althouse, president of the Association stressed an increase of $8,000,000 in the tax burden of the Pennsylvania companies during the past year, rate reductions of more than $9,000,000 and $7,000,000 of flood damages sustained by the Pennsylvania companies, all of which, Mr. Althouse said, pose the problem of greater economies in operation to meet an increased burden equivalent to approximately 14 per cent of gross revenue, only a part of which will probably be regained from increased consumption.

In connection with rural sales, Mr. Althouse pointed to the nine-year old Pennsylvania plan of rural electrification which has connected 188,000 rural homes and farms to 10,000 miles of rural lines. In 1936 Mr. Althouse predicted 2000 additional miles of rural line would be constructed.

Congressman Charles A. Halleck, of Indiana, pointed out that the nation as a whole suffers when zealous partisans take advantage of periods of economic stress to inject their pet theories of social reform. "It is absolutely silly," he said, "to demand of the managers of private business that they put men back to work and then hit them in the head with a governmental club every time they try to do anything."

"The National Safety Council states that 5 per cent of the industrial accidents were due directly to faulty illumination," said J. Russell Craig in his paper "Light Up for Safety." "If this 5 per cent were removed by proper lighting the cold cash saving to industry would be nearly $78,000,000 annually," he said.

G. W. Allison of the Edison Electric Institute discussed the Institute's national sales activities.

I. L. Craig of the Philadelphia Electric Company was elected president of the Association for the ensuing year.

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# Understanding

**By A. J. Althouse**

*President, Pennsylvania Electric Association*

**An address before the Twenty-ninth Annual Convention of the Pennsylvania Electric Association Wednesday Evening, September 9, 1936.**

IN MY remarks a year ago, after having been chosen your President for this administrative year, I expressed the wish that the slogan for the then coming year be "Understanding" —"With the hope that we may establish a better 'understanding' of our business by the customers whom we serve."

Quoting from Proverbs: "Happy is the man that findeth wisdom, and the man that getteth understanding; for the gaining of it is better than the gaining of silver, and the profit thereof than fine gold."

It was my privilege to attend the Fifth Annual Convention of this Association here at Bedford Springs in 1912, and it has been my good fortune to be able to attend every Convention since that time. My first attendance left several impressions. Most outstanding were the opportunity of the delegates to such meetings to learn more about the intricate ramifications of this business, and the freedom with which men discussed their problems with each other.

President Orr, in addressing that Convention twenty-five years ago, stated: "First of all, the Convention is a sort of clearing house. Through it the experience, the training and judgment of many men are made available to all. The exchange is effected through the reading of papers, especially prepared; through the discussions that follow; and through the opportunities afforded of bringing all the members into personal contact." This clear-cut expression of the purposes of this Association holds just as true today as it was envisioned a quarter of a century ago.

Our Industry was thought to have innumerable problems in those days, but —in light of our experience during these recent years—the problems of today, and the outlook for the future, are more vexing and troublesome. Certainly the problems are of a different nature than they were then.

The subject of "understanding" covers such a broad field in our business, that time limits my observations to the human side of our employee organizations and the customers whom we serve.

We have passed through the inventive and constructive stages to a large extent, and are now in the development era. We were slow to realize, that as a service monopoly we would be subject to attack. We were too busy constructing power plants and lines to place any importance upon the need for acquainting our customers with the problems of rendering service to them in a human, "understanding" manner.

Because of the complex nature of the light and power business, the customer has to take a great deal "on faith" when dealing with the power company; for he knows nothing, or very little, of the intricacies of the business or the elements in which the company deals.

The misinformation and lack of "understanding" among all classes of people, of the problems of utility service, is astounding. This even applies to a considerable degree to persons connected or closely affiliated with the Industry.

This situation, then, brings the issue squarely before us:

Do we bring our employees together and keep them properly informed about the Company's problems?

Do we make it possible for them to really learn the details of our business—their business?

Do we believe that our business is the business of every last man and woman in our employ, no matter what his or her job may be?

Do we provide opportunities for our employees to learn how to perform functional duties more economically and with greater safety?

Are we concerned with the physical condition and mental attitude of our employees?

Do we instruct our employees in the fundamentals and principles involved in the conduct of our business, in order that they may perform their jobs in a human and understanding manner?

Do we encourage our employees to reacquaint themselves with the fundamentals of our constitutional form of government, with particular emphasis on their privileges and responsibilities as American citizens?

The need for continuing attention to these questions is obvious. Their fulfillment is the problem of each individual Company.

Just a year ago Mr. Liversidge, in addressing the Convention, impressed upon us the need for educating our employees in order that they may have a clear, working understanding of our problems.

Likewise, Mr. Phillips, in his address, stated that "the employee who hopes to win the confidence of the public must have two essential qualifications. First, he must be honest and sincere, and he must have a sympathetic interest in the customers' problems. Secondly, the employee must feel a genuine confidence in the integrity and honesty of his Company."

Not only do we have the job of getting our employees to tell our story to our customers in a dramatic, human, interesting and appealing manner; but the problem of making sure that they thoroughly understand and appreciate the effect of recent state and Federal legislation upon the security of their jobs, their earning power and their standards of living.

Take, for example, the Federal Social Security Act. This legislation is of peculiar and vital importance to Pennsylvania because of the magnitude and varied character of its industries. Pennsylvania is the source of roughly ten per cent of all Federal taxes collected. It includes more than seven per cent of the inhabitants of continental United States. Electric light and power companies, employing 23,000 out of a total of 3,000,000 workers in the state, will be affected by whatever unemployment compensation laws are eventually enacted.

It is important that our employees realize the need for some form of security against the distress of involuntary unemployment and the infirmities of old age, and that such security be systematically provided in the most effective and lawful way, consistent with the maintenance of productive effort.

One of the most important features of the Social Security program during the next few years will be the tax on employees' incomes, with the companies as the tax collectors.

Because of the stability of employment in our Industry the returns to public utility employees as a class, from taxes paid as the result of social legislation, will be among the lowest.

Deductions from employees' earnings for this purpose are apt to create an employee relations problem. Great care should be taken, therefore, that each and every employee understands the purposes of, and reasons for, social security legislation and its resultant tax costs to both employers and employees.

Critics of the policies of the utility industry claim that "the barrage of criticism has driven most utility men behind closed doors, and forced them to do indirectly those things which other classes of citizens do openly."

However, the tide is changing, and American common sense is asserting itself. We must be opportunists and endeavor to have our customers think of us, not in terms of balance sheets, poles, cables, wires, and torn-up streets, but as a group of fellow human beings, striving honestly to give the best service we know how. Then, and only then, can we be satisfied that we have started in the right direction.

Lack of understanding is not peculiar to the present day and age alone. In reading the interesting early history of the development and use of alternating current systems, we find that a bill was introduced in the Senate of the State of Virginia in 1889 prohibiting the use in that state of any electric potential exceeding 800 volts for direct current systems and 220 volts for alternating current systems. The proposed legislation of that day falls in the same general category of the current anti-utility laws which are based upon prejudices, selfish interests, personal glorification, and lack of understanding of the problems to be solved.

Perhaps we have not given sufficient recognition to the need for appealing to the people's hearts, rather than stuffing their heads with cold facts. Our customers are human beings, and social by nature. We, then, must be more human, and change our customers' feelings toward electric service so that they will not regard it as something that takes money out of their pockets every month, but a means of providing pleasures, comforts and conveniences.

Obviously, then, we need:

First—A cross-section analysis of the attitude of our employees as reflected by their contacts with our customers.

Second—Instruction and training of our employees to meet our customers on a human basis.

Third—A determination of the remedies necessary to correct wrong Company practices and policies.

Fourth—Intelligent and understanding supervision over operations and employees' actions.

Fifth—An aggressive plan for giving our customers understandable information about the business of rendering electric service, so that they may know the truth.

My own experience affirms that there is no way of writing into our routine the human touch which means so much in establishing friendly contacts with our customers. The job is up to each employee, individually, to be alive to our responsibilities to the people whom we serve; to sense when to stick to routine practices and policies, and when to go beyond them by meeting an issue and making lasting friends.

One of the disadvantages which has unconsciously crept in upon us, in the formation of large power systems, is the centralization of most of their functions. There are reasons and justification for the elimination of small operating units and the consolidation into large logical units. The industry has been able to standardize and unify construction and operation, and provide economical sources of power supply.

However, in the days of small companies and localized operation we had an entirely different customer contact situation. Every customer knew every electric company employee, including the manager and the officers of the company. Service was rendered on a basis of man to man understanding. If you had trouble in the power plant and the lights were out, the customers, because of their more intimate knowledge of what was going on, had a sympathetic tolerance. If any questions were raised you had an opportunity to eliminate any unfriendliness before it became an inflated, fantastic feeling of inattention and inefficiency on the part of the company's personnel.

Probably because of economic evolution (the natural growth of the utility industry), we have come to the point where, to a considerable extent, our rank and file customers form their opinions of the service company through their contacts with meter readers and bill collectors. These men, although loyal and sincere, cannot be expected to be thoroughly acquainted with all the functions of the utility industry. There is constant development of new uses for electricity, new appliances, new methods, routines, etc. The meter reader and bill collector, as such, are not able to keep abreast of the changing and increasing operations of the company and its policies, and still do justice to their routine jobs.

In some sections, where there is a predominance of outdoor metering, practically the only contact the customer has with the Company is through its employees, when paying his bill. Occasionally these customers, through lack of proper contact with the service company, make "conjectures" about the Company.

We have drifted too far away from the majority of our customers. In many instances we provide no real service contact. The customer who does not understand the operation of an electric company and why certain things are necessary, is apt to be suspicious and critical. Is it any wonder that our customers are often unfriendly?

When misunderstandings occur between the customer and the employee, the customer too often feels a sense of injustice done him on the part of the Company.

I suggest to you the consideration of ways and means of providing for our customers a personal representative who, to them, is the Company; a representative whom they can learn to know by his first name and who will know all about each particular customer. Such a representative will be in a position to talk understandingly with each customer in terms of his own personal interests, needs, desires, likes and dislikes. He can talk to his people in terms of their jobs, their families, their homes, their investments, personal ambitions, the

community, the streets in front of their homes, the policemen keeping their streets safe, the street lights on the corner, the schools, their future as American citizens.

It does not require any stretch of the imagination to visualize what customer relations would be under such circumstances, with the principle effort—"How to be of greater service to customers."

The magazine *Fortune* published its first survey of sampling public opinions by the familiar commercial system in July, 1935, and found that 40.8 per cent of the persons interviewed considered their monthly electric bill high, 1.9 per cent low, 53.9 per cent reasonable, and 3.4 per cent didn't know. Similarly, 49.9 per cent considered their tax bill high, 1.7 per cent low, 41 per cent reasonable, and 7.4 per cent didn't know.

A year later, in July, 1936, we find in *Fortune's* quarterly survey that 55.6 per cent of the people interviewed believed that electric light and power companies should be publicly owned, with about 14 per cent answering "don't know." This, without a doubt, is the result of political agitation against p r i v a t e l y owned companies which has been conducted on a national scale.

During these days when millions of men have been out of work, lost their savings, and in many instances their self-respect; and are fearful of the future; it is only natural to be skeptical and critical of any business which makes ends meet.

With the people in that frame of mind, as they grope about in their personal doubt and despair, it is not surprising that they have been led to believe that a change from private to public ownership would be beneficial to them.

Even though the power question has been made a national issue, the public will pass judgment mainly from the point of view of their local experience.

Recognition should probably be given to the growing tendency toward formation of groups; groups whose activities are carried on for subsidies, privileges and influence, whether wise or unwise. If group action is the order of the times, it would appear that users of electric service, as a group, have much at stake, and can wield a great influence in solving today's vital problems.

As an example, the cost of electric service amounting to nine or ten cents a day is only one-twentieth of the average tax bill, and proper appreciation of this fact should be actively promoted.

I do not wish to convey the impression that our Industry does not have a loyal organization. Just a few months ago the ingenuity and loyalty of the employees of the light and power industry were put to a severe test, when the raging flood waters overflowed their boundaries and inundated power plants and substations, and put out of service many transmission and distribution lines. It is to the everlasting credit of the initiative and loyalty of our employees that service was restored to the interrupted areas with such promptness and efficiency.

The highest words of praise and commendation do not express the deserved appreciation for the spirit displayed by these employees during that emergency. Unmindful of long hours, regardless of the dangers to themselves, without adequate food and comforts, these men and women worked to save company property, as well as customers' property, from greater damage, and to reestablish service wherever it had been lost.

I believe this misfortune to our industry has done a great deal to make our customers appreciate what our service means, especially so because of the dramatic manner and the outstanding human appeal with which it was publicized.

While speaking to the Engineering Section personnel at their meeting last February, I made this statement, which I believe bears repetition:

"You and your friends fill a certain station in life in your respective communities. You earn your living engaged in rendering a necessary public service. Politicians have succeeded, to an alarming extent, in convincing ordinary folk that industrialists, business in general, and public utilities in particular, are public enemies. Are you doing your part in the job of counteracting this undermining of business in general, and your jobs in particular?"

Businessmen and responsible leaders of men in industry have too long sat idly by and washed their hands of the economic hodge-podge, trusting to someone else to keep this country's business within reasonable safety limits and to provide proper protection.

It would seem, therefore, that we ought to reestablish the fundamentals, principles and regulation which enabled American business and industry to reach the supremacy which rightfully belongs to it.

Business and industry, including labor, are subservient to, and must acknowledge the necessity and right of government to regulate. However, it is un-American and against the very fundamentals of our Constitution, for government to manage and control the business or industry it is supposed to regulate. None of us will resist regulation as regulation for the common good, but if we have hope for future business development and assurance of personal liberties, then I suggest to you: Make every effort to have our customers understand the trend toward national regimentation, in order that they may have adequate appreciation of the probable ultimate results.

A large percentage of the customers of privately-owned light and power companies are, either directly or indirectly, investors in these companies. In most instances these investors are not familiar with, nor do they comprehend, what is happening to their investments.

It is difficult to believe that there is being distributed among the teaching staffs of schools and colleges, information in connection with the so-called "Power Issue" of "Building America," with the suggestion that this information become, in some manner, part of their curriculae, to be discussed and amplified in the classroom. This movement, according to the Chicago *Tribune*, is financed under a W.P.A. project.

Most of us have always felt that subjects taught in the schools should be factual and not controversial. Most parents fail to appreciate the fact that but one side of a controversial issue is thus being presented, and will readily believe that which is taught their children. Nevertheless, there exists this method for influencing people, either rightfully or wrongfully, and a questionable effect is being created thereby.

The light and power industry personnel has acquired an enviable reputation for its initiative, resourcefulness and genius in developing its business and service to its present degree of dependability and usefulness. The utmost degree of perfection in service has been attained by men who, with unselfish spirit, and imbued with the desire to be of service to mankind, devoted their whole life-time to the invention and development of material and equipment for use by industry.

We have a similar group of men who,

by their indomitable spirit, have developed by practical means, the art of applying the materials and equipment to the great supply systems used in rendering electric service.

We are proud of all of these men, and as a group we honestly believe they have no equal. Given a job, a sensible solution has always been found.

The light and power industry personnel is confronted with a problem somewhat foreign to its normal conventional limits. It is that of being leaders among men, to educate and labor with their friends and neighbors in an endeavor to stem the tide with which the unthinking American public is drifting.

These utility men have the knowledge, initiative and ability, if they are properly started and consistently counselled as to the principles and fundamentals of the American form of government which has stood the test of time for nearly a century and a half, to be the leaders to whom I have just referred. This is true, because they are part of an industry that has contributed more than any other to this Nation's development and the improvement of its social standards.

As a note of warning: If, because of continued unwise and unsound legislation, short-sighted administrative judgment, or lack of the needed cooperative guidance; business and industry should be materially stifled, our social order, and our standards of living must eventually decline. This industry has a selfish interest in the economic well-being of all business and industry; aside from the fact that the Industry's personnel has a patriotic, as well as a natural duty, with relation to its fellow-men.

The strain of the utility situation in this country would be greatly alleviated if its citizens were made fully aware of the detrimental influence which Government agencies are attempting to inflict upon our electrical supply institutions. The utility business is today very willing to play an important role in helping the country march out of depression. It can be easily accomplished—providing the American people are given a clear understanding of the true facts, and then encouraged to demand "fair play" for their own ultimate benefit. Here, again, much depends upon "understanding."

We have drifted somewhat in our thinking, but, in order that we may find the best solutions to the problems confronting us, it is essential to have a proper background of appreciation and understanding. I present these thoughts in the hope that they may renew your trend of serious thinking, and motivate concerted action.

I believe I can portray to you the importance and necessity of real sympathetic understanding on the part of utility employees, by comparing the personnel of our organizations to the personnel of a symphony orchestra:

Visualize a great symphony orchestra! Each member has his individual part to play; each is in tune with every other member. The tympani may have only a few notes, while the first violin has a leading part through the composition. The conductor lifts his baton and a wonderful harmony of sound comes to life. Each piece is in time, each playing his part as it is scored, each contributing to the splendid performance of the entire orchestra. When the few notes of the tympani are needed, they are played in time and in tune. All is the result of understanding, cooperative effort!

Now let us substitute our own organization in place of the orchestra—a symphony of public service! Let the investors in our securities represent the percussion instruments; the employees organizations—the strings; our customers—the brass; the generating stations—the woodwinds; the transmission system—the cello; and the understanding cooperative effort—the Management.

We realize that each part—the customers and the symphony of public service—must be in time and in tune, and each must play its part as it is written in the score. A discordant note (misunderstanding), a section which fails to keep time (not telling our story wholly and convincingly)—and our whole symphony is a failure.

Employees who do not fully apppreciate or understand (the strings flat), dissatisfied customers (the brass sharp), lack of sympathetic understanding of all of these problems (the conductor—or Management—at fault)—and our symphony becomes an object of criticism and censure.

That is why, in my opinion, we must have definite plans to make sure that our customers have a better and fuller understanding of our problems and our business.

How will the public, whom we serve, see us after a period of consistent effort to present our problems in an understandable manner? I am sure we will be looked upon as individuals—desirable citizens—and our companies as institutions of character.

I am also convinced that we will neutralize, to a very great extent, the effort of propagandists, militarists, and reformers to harass business and industry in this country.

We must have constant faith that the common sense of the people of this country will cause them to react properly, if we will but show them that we are honestly trying to live up to the simplest and finest code of business ethics yet given to mankind—

"Do unto others as you would have them do unto you!"

## E.E.I. COMMITTEE MEETINGS SCHEDULED FOR SEPTEMBER AND OCTOBER

Meetings of five committees of the Institute will be held in September and October, as follows:

The *Accident Prevention Committee* meeting will be held Monday and Tuesday, October 19 and 20, at the Lord Baltimore Hotel in Baltimore. Arrangements have been made for a demonstration of pole line work that will be of special interest to members of the committee.

The *Electrical Equipment Committee* meeting will be held Monday and Tuesday, October 26 and 27, at the Sagamore Hotel, Rochester, New York.

The *Prime Movers Committee* meeting will be held Monday and Tuesday, September 28 and 29, at the Cleveland Hotel, Cleveland, Ohio.

The *Sales Committee* meeting will be held Friday, October 9, at the headquarters of the Edison Electric Institute, New York.

The *Transmission and Distribution Committee* meeting will be held Thursday and Friday, October 8 and 9, at the Peabody Hotel, Memphis, Tenn.

*Forbes Prize Paper*

# Preserving the Industry By Better Public Relations

**By Louis F. Conti**

## PART I. PUBLIC RELATIONS BASED ON FIXED FACTORS

GOOD public relations in the Electric Light and Power Industry are based on two types of factors, one fixed, the other flexible. The fixed factors are service, rates and operating policies. These are regarded as fixed because they involve the product, the selling price and the manner of delivery of the product. They are and will always be of first importance to the customer. On them the industry was built.

The flexible factors can be summarized under a single heading—"extra-operating" policies. These policies are neither directly concerned with the generation and transmission of electric current nor directly concerned with its sale and distribution. Instead, they are the extra efforts on the part of the company to add to and maintain the good will primarily effected by the fixed factors above. They are flexible because they are adaptable to the changing economic, social and political trends of the day. In these trying times, they are, as far as the industry is concerned, of even greater importance than the fixed factors.

The crisis now facing the industry can be solved only by the people. In order to enlist their support it is necessary to stress more than ever the basic fixed factors which underlie all good public relations. At the same time, the industry must bring into play with all the skill, experience, acumen and caution at its command the full force of its extra-operating policies.

### Service

Service is still the most vital and necessary element in the creation of cordial and friendly relations with the public. Service is the steady, uninterrupted flow of current to give light, power and heat. Their uses in a multiplicity of forms and functions have transformed a nation. Service is so perfect that the people grasp the tremendous significance it has on their lives only when a breakdown occurs, a rare phenomenon these days.

With the passing of years the high regard that the public held for readily available, steady, reliable service has somewhat dimmed. As more years pass, the matter-of-fact and unappreciative acceptance of unbroken service will become more and more pronounced.

The industry should keep alive the high value of service. The people should be reacquainted with its forgotten blessings. The part played by private initiative and resourcefulness in bringing them electricity to serve their purposes should not be lost in oblivion. The accomplishments of its great men, its contributions to mankind, its history should be revealed, for contained in it is the story of the remarkable growth of our country. The knowledge of technological improvements of the day developed to guarantee reliability and constancy should be shared with the public.

The question of rural electric service should command the increasing attention of leaders of the industry. It is a difficult and complex problem with dangerous political aspects. Groups hostile to private ownership and politicians from farm areas, aware of its widespread social interest, eager to receive the support of the millions on farms who do not enjoy the benefit of electricity, are daily with greater vigor using the issue of rural electrification to strengthen their positions. That of the industry is ever becoming more precarious.

Facts are now needed to show what has been done in the direction of rural electrification, and more facts to reveal projects planned. In addition, the program should be speeded up.

### Rates

Rates, through newspapers, magazines, politicians and regulatory commissions have received more adverse publicity than any other single issue in the industry. Rates underlie all present agitation. Through the misrepresentation of facts and the dissemination of half-truths, public opinion has been harmfully inflated. Whatever unfairness and inequalities may have existed, these have been so grossly exaggerated and their importance so overstated that in the resulting controversy, the real issues have been lost.

In order to mitigate the great harm that has been done and to minimize the risks of probable future attacks, companies should review rates from their fundamental views. These involve the following:

1. Does the rate schedule encourage the public to use more current?
2. Are rate schedules just with regard to:
   a. Domestic classes: the large and small consumer?
   b. Domestic, commercial and industrial groups?
   c. The company?
3. In what way do rate forms cause dissatisfaction and encourage criticism?
4. What can be done to offset misinformation concerning rates?

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*Immediately prior to his connection with the Westchester Lighting Company, Mr. Conti was employed in connection with the inventory and appraisal of the Westchester Lighting Company's properties.*

The proper solution of the foregoing would do much to restore a normal and better public attitude. The following would contribute toward this end:

1. Rate schedules should be of a promotional or inducement nature. The results would be to the interest of the customer and the company.

2. Experience in many areas shows that the most effective schedules are those wherein each group or subdivision of group shares a just, or as near just as can be obtained, portion of his fixed expenses. Rate schedules which include a fixed or minimum charge and allow some current for this minimum appear to be satisfactory.

3. Complex rate forms which are not easily understood cause much dissatisfaction. They tend to create beliefs of discrimination and unfairness. Simple and straightforward schedules would help to remove this feeling and also help the company by reducing labor and bookkeeping. In addition, the rate schedule printed on the monthly form should be of such a nature as to attract the attention of the customer who, surprisingly enough, very often does not know how and what he is being charged.

Varying rate forms in an area served by a company are very often the cause of criticism. By making forms uniform throughout the area, this could be obviated. In a larger sense, rate forms should be, as far as possible, uniform throughout the country, the more so since nationwide communication is so easily and rapidly effected.

4. To offset misinformation concerning rates, companies should tell the public what lies behind their bill and what they are paying for. The popular notion that commissions were formed exclusively to induce lower rates should be broken down. The customer should be shown that he is getting more for his dollar than he spends on necessities or luxuries; that he stands to get lower rates by perfection of equipment and increased volume of consumption and that the part he plays is instrumental in achieving this. Companies, through an educated and interested personnel, can reveal the inaccuracies and half truths behind the rate statements of hostile groups and politicians.

### Operating Policies

Economists state that with the perfection of machinery and equipment and the resultant decrease in the numbers engaged in production, the trend is to employ more persons in the special capacity of supplying the commodity to the customer with greater expediency and with greater attention to his requirements, material and abstract. Business and industry everywhere have reflected this trend.

The electric light and power industry, however, did not awaken to the full significance of what was happening in time. In anticipating and catering to the needs of the customer attendant to the supply of the product or service, it was far outstripped, especially in the large cities, by stores, amusements, hotels, restaurants and other forms of business. This was a grave mistake. By the very nature of its monopolistic structure, the industry should have been with the leaders in providing improved human service. The feeling that the industry was abusing a privilege was responsible, to a great extent, for the growth of widespread criticism.

The industry should perfect its human service policy down to the smallest detail. Human service is the manner in which electric service is delivered. By its perfection, the industry will go a long way toward eradicating the inherent democratic dislike of monopoly. It can minimize and prove unfounded the criticism it has suffered because of this feeling. Human service, moreover, offers a practical and fertile field for the building of good will. It plays a three-fold part. One, it makes more real and emphasizes the importance of electric current. Most customers have but vague notions of what they are buying. Two, it enables the customer to feel that he is getting value for his money and in a form he can more easily comprehend and appreciate. Human service definitely appeals to the emotional side of a customer's nature. Three, it offers many opportunities for direct contact between correctly trained employees and the public. These contacts can be constructively and truthfully used in shaping opinions, impressions and beliefs.

Courtesy, friendliness, the building of confidence, efficiency and the reputation for fairness are requisites everywhere. In addition, the special problems of specific areas should be studied. In large cities where contacts are impersonal, where demands are more strenuous and exacting, red tape should be reduced to a minimum. Intelligence and efficiency should be stressed in the office and on the outside. Installation of service should be rapid and reliable. Complaints should be intelligently handled. Connections to department and person should be made quickly. Service trouble after notification should be promptly remedied. Good will, in the city, is created more by courtesy and reliability than any other combination of human service factors.

In the suburb and town, contacts are more easily humanized. There is no better way of illustrating this than by citing the actual case of a company which enjoys good will to a high degree in its area. This company's men who contact the public are trained not only in the observation of personal niceties, but are also taught how to respond to the many difficult human situations which arise or might arise in the course of their work. They are the company's salesmen of good will. It is their job to perform their specific tasks in such a manner that they build and preserve the company's good standing.

The company maintains an active force ready for call duty on quick notice. Customers in difficulty because a fuse has blown or a refrigerator does not function correctly, need but telephone and a service man is sent directly to adjust the trouble. Last Thanksgiving morning, a refrigerator in which the food destined for the feast was stored began defrosting. The housewife, who had many guests coming for dinner, anxiously called the company. The service man on his arrival readjusted the mechanism to prevent further defrosting and left. Presently, he returned with sixty pounds of ice, a reserve, if the cubes did not harden in time.

The employees are trained to be helpful to the community and considerate of the public in ways outside their work. Drivers of company cars are extremely courteous. Many who carry with them first-aid kits, inasmuch as they have been trained for emergencies, prove of great assistance on numerous scenes of accidents. Employees have saved, or have helped to save, many lives during the time this policy has been in force. These incidences receive wide publicity through newspapers and by word of mouth.

The above company has acquired through its program of human service a character of helpfulness, reliability and a personality of friendliness that keeps it immune from criticism, even in this crucial period. Its position in the area it serves is secure.

An employee who has faith in the industry and who works under satisfactory conditions is an asset to the company and an agent of good will. Two hundred and sixty thousand such employees projecting their own interests on that of the industry are invaluable. Through benefits, adequate salary, promotional opportunities, good general treatment and good working environment his satisfaction can be assured. By education and training his faith can be developed. The personnel management problem should receive even more study and attention than it commands today.

Promoting the sale of appliances

throughout the industry is important for many reasons. All of them directly or indirectly affect public relations. Their greater use increases the consumption of current; they help to balance the load factor; they offer opportunities to strengthen friendship by contact. But more than these, they become by the manner in which the sale is made and the manner by which they are serviced, another link in establishing the indispensability of the company to the customer.

It is safe to say that, had the industry been older, had it achieved a more indispensable relationship with the public before the depression, the crisis confronting the industry would not have occurred. It is only during periods of national catastrophe that the support of the people can be enlisted in reforms, real or fancied. The telephone system has escaped the criticism to which the electric light and power industry has been subjected, by maintaining their indispensability in the eyes of the public through complete control of equipment, its installation and servicing.

The sale of appliances should be promoted in the manner and spirit of contributing to the public good. This is, indeed, their primary purpose. Excessive commercialism in any form, should be avoided.

Public relations resulting from the fixed factors of service, rates and operating policies are largely shaped by the executive. The industry, delicately balanced as it is, cannot lose sight of the fact that the solution of the huge problem facing it ultimately rests with the public. Management must focus its energy and attention on the building of better public relations. This is its most important job.

The attacks by hostile groups and politicians on the few who have been guilty of abuse have created in the mind of the public an erroneous impression which covers the entire industry. This must be corrected by a new spirit and a new example. The public must be impressed with the truth that "every responsible element in the industry wants to conduct its business to the best interests of consumers and the public generally."

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## PART II. PUBLIC RELATIONS BASED ON FLEXIBLE FACTORS

Flexible factors determining good public relations are those which do not involve the intrinsic policies of the company. They are set neither in scope nor manner. They are the relationships of the company with the public, agencies, groups and interests in ways that are beyond — extra to operating. These extra-operating policies are conditioned by the problems and the trends of the day.

The crisis which confronts the industry is essentially political. Good public relations now require that the industry bring into play, to the best of its ability, ways and means of reducing criticism and hostility, of bringing the industry closer to the people and achieving more friendly relations with other groups and interests. True facts and figures behind the conflict between socialized hydroelectric "justice" and the industry will never be as important as they are today. If the people knew these facts and if their significance could be interpreted to them, pending legislation might be averted and that already enacted might be localized in its effects.

Newspapers are not vast machines with unchanging, adamant policies. They are run by a group of human individuals. If the industry can win the confidence of these individuals, they will listen to its side of the story. They will weigh the facts and be guided accordingly. Many biased and harmful articles are the result of fabrication when the real information and necessary cooperation are denied the newspaperman. The good will of the editor alone is not enough, the company should be helpful to the newest cub as well. The editor does not cover the story, but the cub may.

Friendship with newspapers is built up by establishing confidence over a period of years. The average public relations counsel does little more than send out over-written releases boosting his company or telling of some meritorious act performed by the company or its employees. Instead, the industry should be guided by the fact that the better informed newspaper men are, the more they will appreciate the problem of operating to the satisfaction of the public. In any unusual difficulty, the more their sympathies would be with the company. It should be borne in mind that the majority of newspapermen are of high ideals, attempt to write accurately and make reports which, from their point of view, are truthful and fair.

Companies, when confronted by the press, sometimes act as though they had something to shield. When an embarrassing question is asked, the men are often diverted and the question left unanswered. This leads many newspapers of the more sensational type to write exposè articles. The story is "played-up" and becomes news. Other newspapers by virtue of the fact that the article is headlined to part of the public, must also stress the same story. The resultant harm is incalculable. This would not happen if the exposè element were removed by closer co-operation and a more frank attitude. The benefits of this policy would be reflected even in those newspaper chains, national in scope, which are hostile to the industry. Though the policies of this type of newspaper are determined by a central group for the entire country, yet the individuals covering the news are appreciative of frankness and friendliness. Their code is such that they repay by restraint and fairness the confidence they have shared. A reporter who knows the facts will not color his article with prejudices and half-truths. The importance of honest, friendly relations with newspapers, magazines and journals cannot be overstressed. They "shed more light on the public and business affairs of the nation than any other instrumentality of publicity."

The electric light and power industry, unlike many other large industries, occupies rather a mysterious place in the mind of the people. They rarely come in contact with its technological, administrative or operating aspects except in the purely mechanical form of paying the monthly bill at the cashier's cage or seeing certain classes of employees go about their appointed tasks. It is not sufficiently humanized or romanticized.

One way of accomplishing this is through radio, which possesses great potentialities in bringing the company closer to the people. Programs which might be termed propaganda should be shunned. The public is appreciative and grateful for wholesome, entertaining programs offered with a minimum of commercialism. Such programs can accomplish much in endowing the company with a more popular personality.

The part that employees can play to combat biased and harmful opinion and present true facts and figures is great. The employee should first be thoroughly educated in the important phases of the industry, its story, its accomplishments, its mistakes, its economic and social functions, its obstacles. An educated employee will make the interests of his

company and his industry, his own interests.

Employees can be educated through organizations within the company according to professions, trades and group interests; through company bulletins or journals and through social activities. Only a small portion of employees are aware of the full meaning of what is taking place. Their tremendous influence carried into their private activities is not being realized by the industry. Sufficient importance is not being placed on their intelligence to counteract the bombastic utterances and acts of those advocating socialized electrification.

The goal of certain influences is apparently the destruction of holding companies in the electric light and power industry and the further promotion of public ownership through acts similar to T.V.A., P.W.A. grants for municipal plants and R.E.A. If successful, this will be a sign to some that other industries, only slightly less important to the public welfare, will be in turn attacked. The recognition of this truth by these industries have prompted them to strengthen their own public relations. Our industry should cooperate with these others and should endeavor to gain their support to prevent what may be the first step in the collapse of private, large-scale enterprise.

The public, generally, has but limited notions of the purposes and functions of regulatory commissions. They are regarded as agencies which protect the people in the matters of rates and treatment. In recent years, commissions regulating the electric light and power industry have received more publicity causing unfavorable attention to fall on the industry than has been the case with any other utility. The people have come to believe that any industry which must be so closely regulated is by this very fact injurious to their interests. Moreover, when examinations are held and the case is being tried, the company occupies the same position in the mind of the public as a prisoner at the bar, and as a result suffers the same limitations. These instinctive reactions on the part of the public augmented by hostile publicity, repetition and the highly colored and harmful attitude of trial lawyers have tended to minimize the efforts of the company to place good public relations on a firm and lasting basis. If good will is to be insured, these public impressions must be corrected.

The complexities of this problem are many and can only be solved by the appointment to regulatory bodies of men of integrity, judgment and sound capabilities who will perform their duties with the same equanimity and justice to the public and the industry as judges on the bench. The important positions of the commissions should be permanent or quasi-permanent in nature and should be separated from politics. It should be the task of the commissions to tell the public their purposes and functions in order to correct the prevailing wrong beliefs and harmful prejudices. Companies should assist and cooperate with these commissions in all possible ways.

The public is not sufficiently informed of the magnitude of the industry, that it is probably the second largest in the country, that its direct and indirect investors total millions. The public does not realize the huge amount of taxes it pays to the government, the numbers it employs, the billions it is ready to spend for capital construction and durable goods, the additional numbers it will thus put to work and the consequent salutary effect on business if only the fear of destruction through government competition were removed or abridged. The public has no clear conception of how intrinsically the industry is related to their economic welfare which, in this age, is almost their entire welfare.

These things the public should know, not only for the interests of the industry, but for the good of the nation and that of the people.

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# Magazine Announces Better Kitchen Contest

THE announcement of a $2,100 cash prize Better Kitchen Contest by *Better Homes & Gardens* in its September issue comes as a real boost to the kitchen modernization movement. Any projects completed between September 1, 1936, and August 31, 1937, will be eligible for the cash prizes.

"The decision to stage such a contest," states Elmer T. Peterson, editor of *Better Homes & Gardens,* "was greatly influenced by the success of the previous five Better Homes Contests plus our belief that we can be of editorial assistance in making the homes of America better homes with more comfort through use of modern equipment.

"According to figures based on tabulations of final entry forms from the 1935 Better Homes Contest, we found that kitchens came in for a large part of the home-owners' expenditures in remodeling their homes," continued Mr. Peterson.

"It is important to note that in the remodeling section 43 per cent of the entrants purchased kitchen equipment; 26 per cent put in new stoves; 16 per cent installed mechanical refrigerators, and 5 per cent purchased electric food mixers —all significant figures to the electrical industry."

There will be two classes in the Better Kitchens Contest. Class I includes old kitchens made modern by remodeling and addition of modern equipment. Class II consists of newly built kitchens.

Cash prizes in each class are: First, $500; second, $250; third, $125; fourth, $75; fifth, $50. This means $1,000 for each class, or $2,000 for both classes. Winning entrants in Class I will receive a special cash bonus of $50 if they submit "Before" photographs with their completed projects—making the total $2,100.

*Better Homes & Gardens* in the announcement of the contest suggests that its readers consult the local Kitchen Planning group in their own cities and points out that these groups are prepared to give help and advice in building modern kitchens.

Plans are now in progress developing a merchandising service, which will be made available to all utilities for use in their retail outlets. This material will include a supply of four-page entry blanks, blown-up covers of the October issue of *Better Homes & Gardens,* copies of the 32-page Kitchen-Planning Book and display posters announcing the contest.

Further details about this Better Kitchen Contest may be obtained by writing the Better Kitchens Contest Editor, *Better Homes & Gardens,* Des Moines, Iowa.

*McGraw Prize Paper*

# Circulation in Water Tube Boilers

**By R. M. Hanson**

IMPROPER circulation of water in generating tubes of straight tube header type boilers is a problem that has long been recognized. In numerous instances it has resulted in excessive boiler maintenance by causing tubes to leak or rupture. Attempts to prevent this destruction of tubes have likewise been expensive and in many cases very unsatisfactory.

The author came in contact with this problem in 1932 when an upper generating tube of a cross drum boiler ruptured with explosive violence. The boiler was one of three which had been in continuous service a little more than a year, furnishing base load steam generation for a 35,000 kw unit in a public utility power plant. The rupture occurred in a 3 inch O.D., No. 8 B.W.G. tube of the top row in the upper bank. It produced an opening approximately 35 degrees from the top of the tube, starting at a point 21 inches from the uptake header and extending 15 inches toward the downtake header. The metal near the edges of the opening had a thickness of from 10 to 20 per cent of that of the original tube wall. Investigation of this and other top tubes in all three boilers indicated that severe corrosion was taking place over a length of from 3 to 6 feet at the high ends of these tubes.

Approximately 140 tubes were replaced in the three boilers during the next several weeks. It was evident, therefore, that tube replacements would be a regular item of maintenance unless the corrosion could be prevented, either by reducing the ratings at which these boilers customarily operated, or by applying some corrective measures to the boilers. Since any reduction of the ratings would seriously reduce the load carried by the turbo-generator unit, means were sought to correct the condition in the boiler. The ensuing experimental work occupied a period of nearly a year before a satisfactory appliance was developed and installed.

During this experimental work it was decided to attempt the measurement of the circulation existing in a single header section when the boiler was operated at various steam flow ratings, with the expectation of revealing thereby the fundamental cause of the improper circulation. The attempt was successful and the data obtained proved both interesting and of considerable significance for they disclosed the existence of pressure conditions under which circulation, in the manner intended when the boiler was constructed, could not exist. Naturally the measurement of these pressure conditions followed and has just recently been concluded.

*Mr. Hanson is the winner of the First James H. McGraw Prize for 1936.*

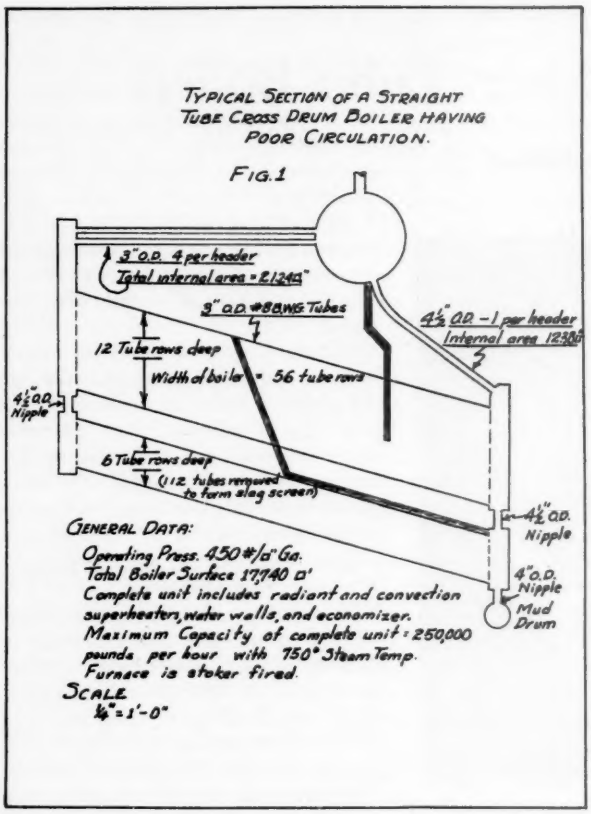
*He was born in Montevideo, Minn., in 1905, where he also received his grammar and high school education. He joined the Distribution Department of the Montevideo Division of the Northern Power Company in 1925. He resigned this position in 1927 and enrolled at the University of Minnesota. During the next two years, he applied himself to his studies during the school year and during the summer holidays returned to his work for the power company at Montevideo. In 1929 he obtained a position with the Northern States High Bridge steam plant in St. Paul, continuing his studies at the University. He graduated with a B.S. degree in 1931, and enrolled in the Northern States Power Company's student engineers' training course.*

*He is now Assistant Plant Results Engineer with the Minneapolis General Electric Company at their Riverside steam station.*

It is the purpose of this paper to present the information secured through this study of flow and pressure, in the belief that it will contribute toward a better understanding of the internal hydraulics of straight tube boilers, and suggest a means of securing such information for all boilers.

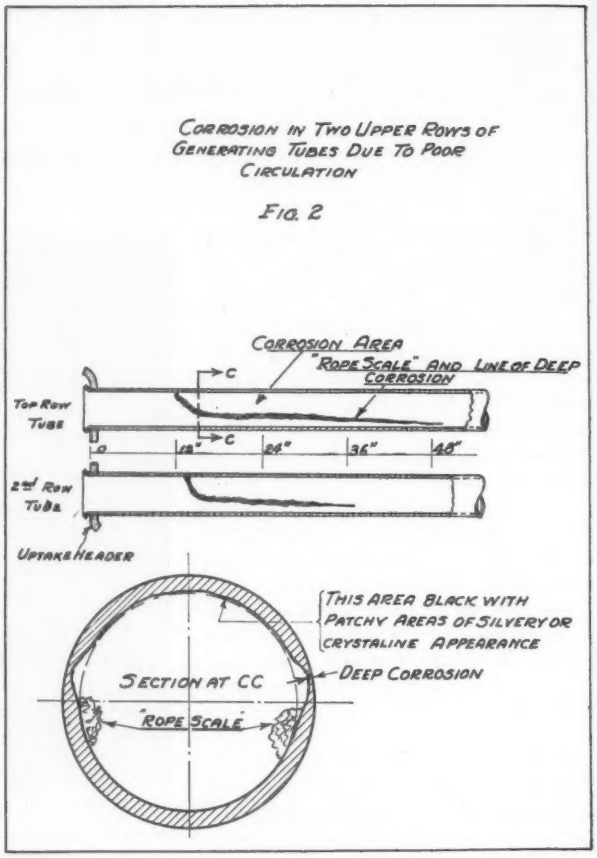
### Events Preceding the Study of Boiler Circulation

In order to afford a better understanding of why and how this study of circulation was undertaken, a short description of the attending circumstances is offered here. The boilers in question are illustrated in Figure 1 which shows a typical section, and also includes information on the amount of heating surface, tube sizes, etc. These boilers, three in number, were first put in service in July and August 1931. On August 14, 1932, after almost continuous operation since their installation, a top generating tube in the upper bank of one of the boilers ruptured, as previously described, upsetting the operation of the 35,000 kw turbo-generator to which the boilers were furnishing steam at its rated capacity. Naturally much concern was felt for the safety of the tubes in the other two boilers. All three boilers were examined as soon as possible with the result that approximately 140 tubes were replaced because corrosion had reduced the original thickness of the tube wall by at least 35 per cent. Figure 2 shows how this loss of metal made the tubes appear in section, and the extent of the corrosion along the length of the tubes in the two upper tube rows. Examination of the interior of the affected tubes revealed the presence of magnetic iron oxide and this was accepted as direct evidence that the tubes had been overheated. In order to determine this definitely, and also to find out when and how much the tubes were overheated, iron-constantin thermocouples were installed at the upper end of a few boiler tubes. These thermocouples were peened into the top side of the outer surface of


3" O.D. 4 per header
Total internal area = 21.24"
3" O.D. #8 BWG Tubes
4½" O.D. - 1 per header
Internal area 12.38"
12 Tube rows deep
Width of boiler = 56 tube rows
4½" O.D. Nipple
6 Tube rows deep
(112 tubes removed to form slag screen)
4½" O.D. Nipple
4" O.D. Nipple
Mud Drum
GENERAL DATA:
Operating Press. 450 #/□" Ga.
Total Boiler Surface 17,940 □'
Complete unit includes radiant and convection superheater, water walls, and economizer.
Maximum Capacity of complete unit = 250,000 pounds per hour with 750° Steam Temp.
Furnace is stoker fired.
SCALE
¼" = 1'-0"

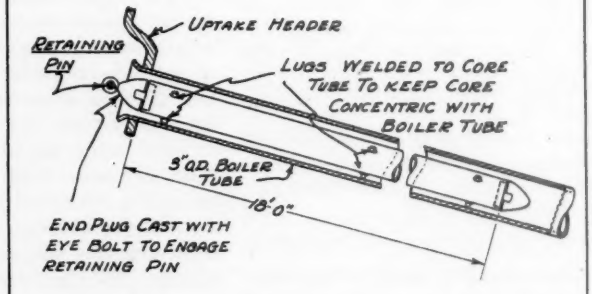
TYPICAL SECTION OF A STRAIGHT TUBE CROSS DRUM BOILER HAVING POOR CIRCULATION.

FIG. 1




CORROSION IN TWO UPPER ROWS OF GENERATING TUBES DUE TO POOR CIRCULATION

FIG. 2


Uptake Header
Retaining Pin
Lugs welded to core tube to keep core concentric with boiler tube
3" O.D. Boiler Tube
18'-0"
End plug cast with eye bolt to engage retaining pin

CONSTRUCTION AND INSTALLATION OF CORE PIPES IN UPPER GENERATING TUBES TO PREVENT LOSS OF TUBE METAL DUE TO POOR CIRCULATION

FIG. 3

THE CORE PIPES ARE CONSTRUCTED FROM "BEDSTEAD TUBING"

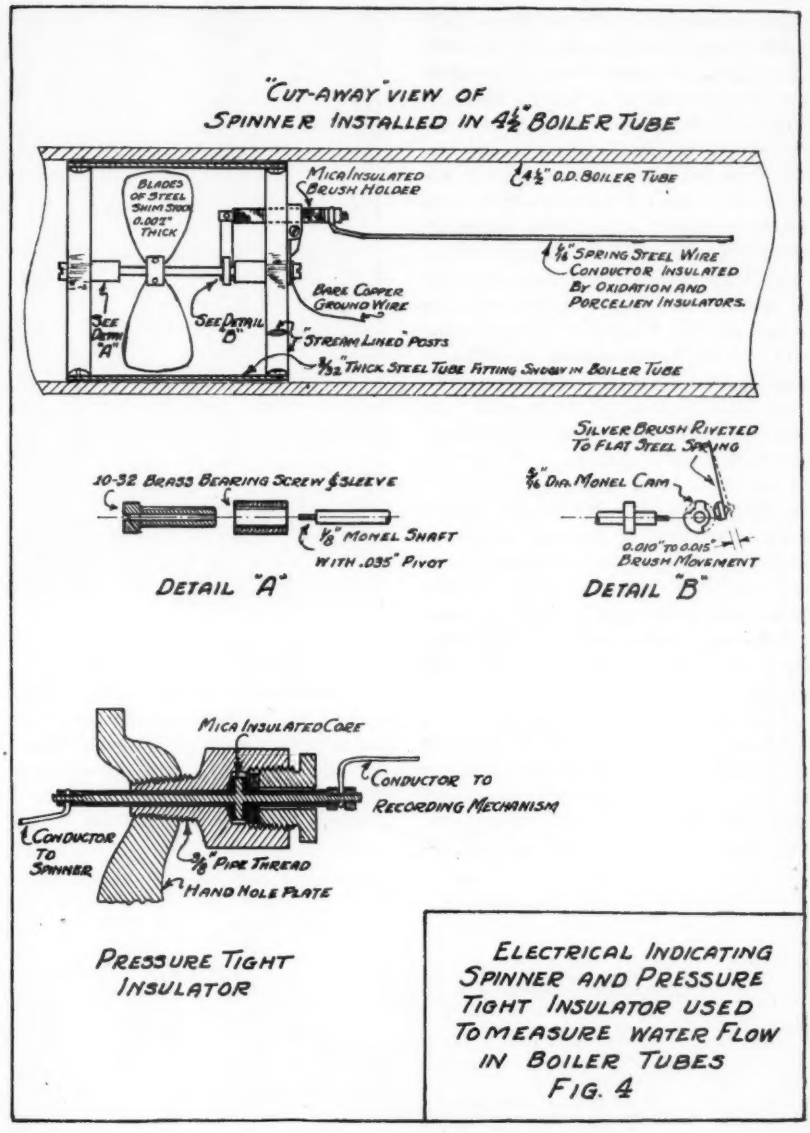
certain tubes and it was immediately evident from the temperatures obtained that some of the upper bank tubes—those farthest away from the combustion chamber—became dangerously hot when the boilers were producing steam at a normal rate.

This tendency toward overheating was found to be present in the first seven tube rows from the top in the upper bank, and was most severe in the top row tubes of central headers where it became noticeable when the steaming rate on the boiler had reached but 20 per cent of its maximum. At the maximum steaming rate on the boiler, these top row tube temperatures were almost twice the temperature corresponding to the boiler pressure. These top row tubes behaved as though they were partially full of stagnant steam in spite of the fact that they were several feet below the water level in the drum.

Investigation of available literature to find a suitable means of preventing the overheating of these tubes disclosed an article published in "Engineering" of August 21, 1931, from which it was learned that a very similar condition in a similar type of boiler in Germany had

been "completely remedied" by the simple means of installing restricting orifice plugs in the lower ends of the tubes subjected to corrosion. This "remedy" was experimented with, although it did not appear to be either practical or safe. While the experimentation with restricting orifice plugs was proceeding to an unsatisfactory conclusion, the idea of using core pipes was suggested, tried, and found to be an effective means of keeping the tubes cool. After several months of experimentation to determine the various length and diameter of cores required by the several tube rows in which overheating was taking place, complete sets of cores were made up and installed. The subsequent operation of these boilers at all ratings up to and including the maximum without any loss of tube metal, has proved the value of this method of correcting the condition of overheated tubes. Figure 3 shows the general features of design of the cores and also illustrates the type of support that was finally adopted.

The cause of the overheating of certain tubes in these boilers was, of course, inadequate or improper circulation. This was apparent as soon as the tube temperatures were measured. In technical publications there are many references to instances where similar trouble with boiler tubes has occurred, but no information could be discovered, at the time it was desired, regarding a successful remedy for the conditions found in these boilers. The experimental work undertaken to find such a remedy naturally resulted in many questions being raised regarding boiler circulation in general, and it became increasingly evident at the time that the cores were being developed, that the answers to these questions would constitute valuable information, not only in regard to the present boilers but also in connection with future boilers. For this reason it was decided to undertake the measurement of the flow in various generating tubes and the first efforts were directed to a top row tube in the center of the boiler where the most severe corrosion trouble had been experienced. The flow observed in this and other generating tubes, led to the investigation of the flow in: (a) a circulating tube supplying a downtake header with water from the drum; (b) the interdeck nipple in the downtake header; and (c) the mud drum nipple. These flow data, when combined, indicated the existence of extremely adverse pressure conditions in those parts of the headers to which the upper bank tubes were connected. In order to secure more definite information regarding these adverse pressures a fluid meter was connected to show the differential pressures existing between the steam space of the drum and various points in both uptake and downtake headers.


"Cut-away" view of Spinner Installed in 4½" Boiler Tube
Blades of Steel Shim Stock 0.002" Thick
Mica Insulated Brush Holder
4½" O.D. Boiler Tube
⅛" Spring Steel Wire Conductor Insulated By Oxidation and Porcelien Insulators.
Bare Copper Ground Wire
See Detail "A"
See Detail "B"
"Stream Lined" Posts
3/32" Thick Steel Tube Fitting Shown in Boiler Tube
10-32 Brass Bearing Screw & Sleeve
⅛" Monel Shaft With .035" Pivot
Detail "A"
Silver Brush Riveted To Flat Steel Spring
⅜" Dia. Monel Cam
0.010" to 0.015" Brush Movement
Detail "B"
Mica Insulated Core
Conductor to Recording Mechanism
Conductor to Spinner
⅜" Pipe Thread
Hand Hole Plate
Pressure Tight Insulator

Electrical Indicating Spinner and Pressure Tight Insulator Used To Measure Water Flow in Boiler Tubes
Fig. 4

The combined flow and pressure data thus secured, not only furnished an ample explanation of the reason for improper circulation in the upper bank of generating tubes, but also suggested various means by which proper circulation in both present and future boilers might be secured.

### Measuring Boiler Circulation

The measurement of the quantity of water flowing into individual boiler tubes, was accomplished in this instance by a combination of mechanical and electrical means. The mechanical part of the instrument, as illustrated in Figure 4, consisted of a two-bladed impeller built of steel which operated on a monel metal shaft having a small pivot on each end. The impeller and shaft were built as light as possible, and the pivots were made as small and free from friction as the material would permit. The bearings, which were made of brass, were supported in steel bearing posts fitted into the ends of a short, thin, steel tube making the whole instrument a compact and easily-handled unit. This instrument was secured in the boiler tubes with short rods which connected the thin steel frame to the tube roll in the header. The electrical part of the instrument consisted of a small cam on the impeller

shaft, cut integral with the shaft, which made contact with a spring mounted silver brush attached to one of the bearing posts by means of a mica insulated stud. This cam and brush arrangement served to indicate the direction of rotation and the speed with which the impeller was turning, when a low voltage source of direct current was impressed on the brush stud. With each revolution of the impeller there was a change of circuit resistance and hence a change in the current flowing. The electrical circuit from the outside of the boiler to the "spinner" (as the instrument was named), was made by means of a pressure tight insulator of mica and steel, also illustrated in Figure 4, installed in an adjacent hand hole plate and connected to the brush stud of the spinner with an oxidized spring steel wire supported where necessary by porcelain insulators. The circuit from the contacts back to the boiler was through the spinner bearings and a copper ground wire from the spinner frame to the boiler header.

Each spinner, before being installed in the boiler was given a cold water calibration which determined the relation of the rpm of the impeller to the mean velocity of the water flowing through the instrument. In every case the rpm of the impeller was found to be directly proportional to the mean velocity of the fluid passing it except for an insignificant part of the range of the instrument where the flow was very low. Figure 5 illustrates two typical calibration curves.

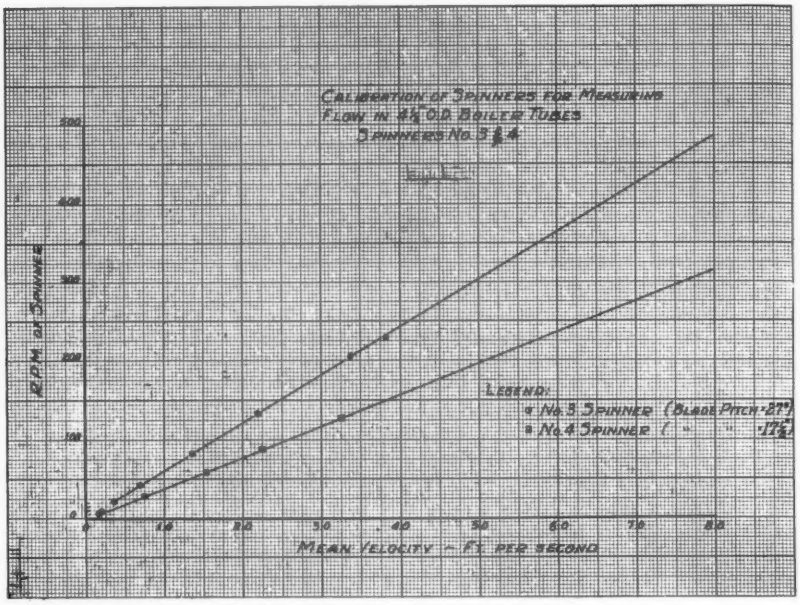
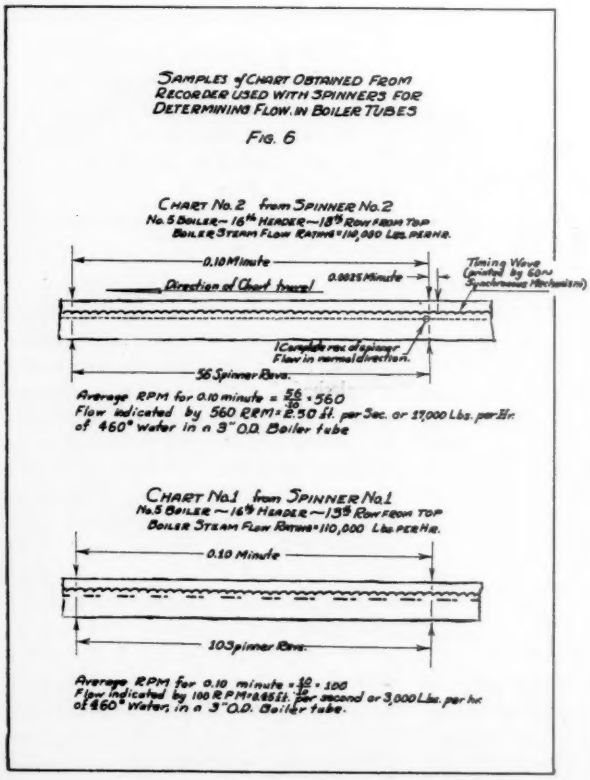
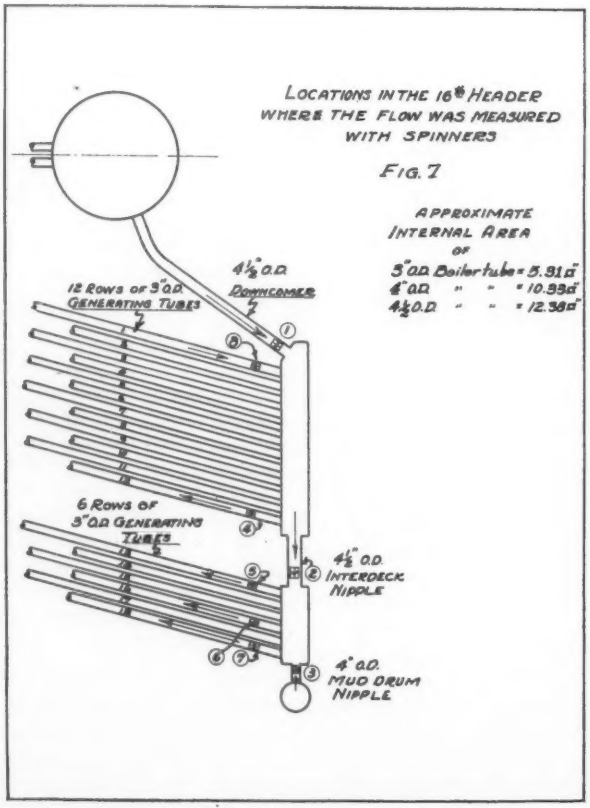

Calibration of Spinners for Measuring Flow in 4½" O.D. Boiler Tubes
Spinners No. 3 & 4
R.P.M. of Spinner
Mean Velocity - Ft. per Second
Legend:
No. 3 Spinner (Blade Pitch 27°)
No. 4 Spinner ( " " 17½°)

*Fig. 5*

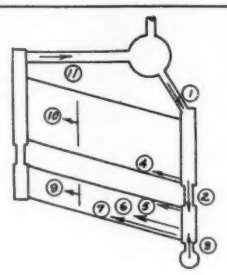
A special instrument was constructed to record on a strip chart the electrical impulses, which resulted from the operation of the spinner. The amount of current flowing when the contacts were separated and with 1½ volts imposed


Samples of Chart Obtained From Recorder Used With Spinners For Determining Flow in Boiler Tubes
Fig. 6
Chart No. 2 from Spinner No. 2
No. 5 Boiler — 16th Header — 18th Row from Top
Boiler Steam Flow Rating = 110,000 Lbs. per Hr.
0.10 Minute
0.0025 Minute
Direction of Chart Travel
Timing Wave (Created by Gov. Synchronous Mechanism)
1 Complete rev. of spinner Flow in normal direction.
56 Spinner Revs.
Average RPM for 0.10 minute = 56/10 × 60
Flow indicated by 560 RPM = 2.50 ft. per Sec. or 27,000 Lbs. per Hr. of 460° water in a 3" O.D. Boiler tube
Chart No. 1 from Spinner No. 1
No. 5 Boiler — 16th Header — 13th Row from Top
Boiler Steam Flow Rating = 110,000 Lbs. per Hr.
0.10 Minute
10.3 Spinner Revs.
Average RPM for 0.10 minute = 10/10 × 100
Flow indicated by 100 R.P.M. = 2.65 ft. per second or 3,000 Lbs. per hr. of 460° Water, in a 3" O.D. Boiler tube.


Locations in the 16th Header Where the Flow was Measured with Spinners
Fig. 7
Approximate Internal Area of
3" O.D. Boiler tube = 5.31 □"
4" O.D. " " = 10.33 □"
4½ O.D. " " = 12.38 □"
4½" O.D. Downcomer
12 Rows of 3" O.D. Generating Tubes
6 Rows of 3" O.D. Generating Tubes
4½" O.D. Interdeck Nipple
4" O.D. Mud Drum Nipple

| Drum Pressure Lbs./Sq. In. Abs. | Flow of water at saturation temp. corresponding to 1' sec. velocity in 3" O.D. Tube | 4" O.D. Tube | 4½" O.D. Tube |
|---|---|---|---|
| 433 to 445 lbs./sq. in. Abs. | 6810 lbs./hr. | 13280 lbs./hr. | 15880 lbs./hr. |
| 449 to 455 lbs./sq. in. Abs. | 6770 lbs./hr. | 13200 lbs./hr. | 15,700 lbs./hr. |

| Avg. Boiler Steam Flow M#/Hr. | Drum Press Lbs./Sq. In. Abs. | Measured Flow Velocity in Ft./sec. & Quantity in M lbs./hr. Location (1) | (2) | (3) | (4) | (5) | (6) | (7) | Computed Flow Steam & Water Mixture Location (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Ft./Sec. | 3.45 | 4.05 | 0.75 | 0.95 | 0.45 | 1.60 | 2.15 | | | 9.38 |
| 433 | M lbs./hr. | 54.8 | 64.3 | 9.9 | 6.5 | 3.1 | 10.9 | 14.6 | 74.2 | -9.5 | 64.7 |
| 50 | Ft./Sec. | 4.25 | 4.35 | 0.60 | 0.95 | 0.45 | 1.65 | 2.60 | | | 4.84 |
| 435 | M lbs./hr. | 67.4 | 69.0 | 7.9 | 6.5 | 3.1 | 11.2 | 17.7 | 76.9 | -1.6 | 75.3 |
| 75 | Ft./Sec. | 4.80 | 4.45 | 0.45 | 0.95 | 0.45 | 1.75 | 2.75 | | | 6.20 |
| 435 | M lbs./hr. | 76.1 | 70.6 | 6.0 | 6.5 | 3.1 | 11.9 | 18.7 | 76.6 | +5.5 | 82.1 |
| 100 | Ft./Sec. | 5.10 | 4.45 | 0.45 | 0.95 | 0.45 | 1.80 | 2.80 | | | 7.55 |
| 438 | M lbs./hr. | 80.9 | 70.6 | 6.0 | 6.5 | 3.1 | 12.3 | 19.1 | 76.6 | +10.3 | 86.9 |
| 125 | Ft./Sec. | 5.25 | 4.40 | 0.40 | 0.90 | 0.40 | 1.80 | 2.75 | | | 8.80 |
| 441 | M lbs./hr. | 83.3 | 69.8 | 5.3 | 6.1 | 2.7 | 12.3 | 18.7 | 75.1 | +13.5 | 88.6 |
| 150 | Ft./Sec. | 5.25 | 4.35 | 0.40 | 0.85 | 0.40 | 1.80 | 2.75 | | | 9.98 |
| 445 | M lbs./hr. | 83.3 | 69.0 | 5.3 | 5.8 | 2.7 | 12.3 | 18.7 | 74.3 | 14.3 | 88.6 |
| 175 | Ft./Sec. | 5.25 | 4.30 | 0.35 | 0.80 | 0.40 | 1.80 | 2.70 | | | 11.28 |
| 447 | M lbs./hr. | 82.8 | 67.8 | 4.6 | 5.4 | 2.7 | 12.3 | 18.3 | 72.4 | 15.0 | 87.4 |
| 200 | Ft./Sec. | 5.10 | 4.20 | 0.35 | 0.80 | 0.40 | 1.80 | 2.70 | | | 12.42 |
| 451 | M lbs./hr. | 80.4 | 66.2 | 4.6 | 5.4 | 2.7 | 12.3 | 18.3 | 70.8 | 14.2 | 85.0 |
| 225 | Ft./Sec. | 4.95 | 4.15 | 0.35 | 0.75 | 0.40 | 1.75 | 2.65 | | | 13.60 |
| 455 | M lbs./hr. | 78.0 | 65.5 | 4.6 | 5.1 | 2.7 | 11.8 | 17.9 | 70.1 | 12.5 | 82.6 |




TABULATION OF MEASURED AND COMPUTED FLOW IN THE 16th HEADER, AND CONVERSION FACTORS BETWEEN VELOCITY AND POUNDS PER HR. IN EACH SIZE OF TUBE.

FIG. 8

on the combined spinner and recorder circuit, was found to be about 20 milliamperes. With the contacts closed the current was about 100 milliamperes. These values afforded a very satisfactory current change for operating the high speed printing solenoid which was used in the recording instrument. Figure 6 shows portions of two typical strip charts which were produced, and illustrates how the charts were interpreted. As may be observed from the charts, both the instantaneous and average mean velocity of the flow past the impeller may be read from the record.

One of the limitations of the spinner, though of no great consequence in the investigation, was the friction between the brush and the cam. This friction caused the impeller to turn unsteadily whenever the velocity of flow was below .25 ft. per second in 3 inch O.D. tubes, and below .10 ft. per second in 4 and 4½ inch O.D. tubes. Moderate changes of brush tension did not apppear to affect the calibration above these lower ranges of flow. It is to be expected, and it may also be observed in the data that are to follow, that flow which is of sufficient velocity to cause noticeable pressure drop due to friction, is well within the accurate range of operation of the spinners. It is quite possible that further investigation of materials and methods of construction may result in an instrument of this type which would be capable of measuring a flow having a velocity of 1 inch per second or less.

The particular advantages of the spinner over other means that have been used for measuring flow in boilers are: (a) the elimination of a packing gland for the rotating shaft; (b) its ease of installation; and (c) its adaptability to any type of boiler. This instrument also offers very little resistance to flow and hence cannot effect an appreciable redistribution of flow in the boiler or header circuit. The combination of very light mechanical parts and the electrical conveyance and recording of the signals produced, affords practically zero "lag" between the point of measurement and the point of recording of the flow.

### The Flow Data Obtained

The flow data obtained through the use of the spinners have been condensed into tables and curves to simplify illustration and reference. The various lo-

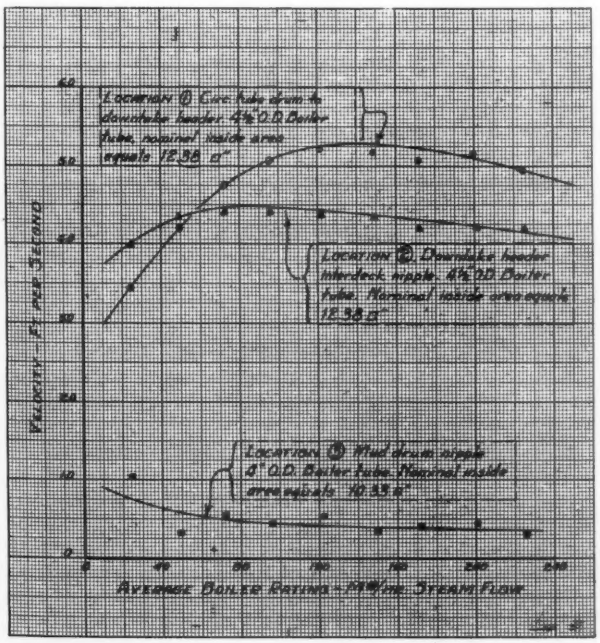

Location ① Circ. tube drum to downtake header. 4½ O.D. Boiler tube, nominal inside area equals 12.98 □"
Location ② Downtake header inter-deck nipple. 4½ O.D. Boiler tube. Nominal inside area equals 12.98 □"
Location ③ Mud drum nipple 8" O.D. Boiler tube. Nominal inside area equals 10.33 □"
VELOCITY - FT. PER SECOND
AVERAGE BOILER RATING - M#/HR. STEAM FLOW

*Fig. 9—Survey of Boiler Water Circulation in No. 16 Header—Location No. 1, 2 and 3*

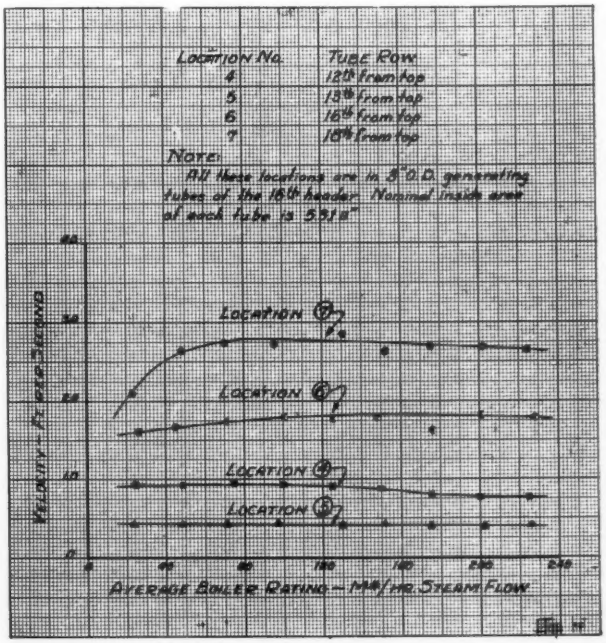

LOCATION NO. TUBE ROW
4 12th from top
5 13th from top
6 16th from top
7 18th from top
NOTE:
All these locations are in 3" O.D. generating tubes of the 16th header. Nominal inside area of such tube is 5.51 □"
LOCATION ⑦
LOCATION ⑥
LOCATION ④
LOCATION ⑤
VELOCITY - FT. PER SECOND
AVERAGE BOILER RATING - M#/HR. STEAM FLOW

*Fig. 10—Survey of Boiler Water Circulation in No. 16 Header—Location No. 4, 5, 6 and 7*

cations in the boiler where spinners were installed are indicated in Figure 7 which shows a partial view of the central header section in which flow measurements were obtained. Arrows at the spinner locations indicate the observed direction of flow. A central header section was chosen because the most severe corrosion had occurred there, and because many tube temperature data were available for that header section.

All of the flow data obtained directly by measurement at locations 1 to 7, Figure 7, or calculated from these measurements are tabulated in Figure 8. Figures 9 and 10 are curves which show how the flow in locations 1 to 7 varied with the steaming rate on the entire boiler unit. The flow observed in the topmost generating tube, Location 8, Figure 7, was almost always from the uptake to the downtake header and therefore is considered separately in the curves shown on Figures 11 and 12.

Referring again to Figure 7, it can be seen that the sum of the flow at Locations 2 and 3 is the total flow into the lower tube bank of this header section. This flow is tabulated under Location 9, Figure 8. Likewise the difference of the flow in Locations 1 and 2 is the total flow into the upper tube bank, and this is tabulated under Location 10, Figure 8. The sum of the flow in Locations 1 and 3 is the total flow into the entire header section and has, therefore, the same weight as the mixture of steam and water that returns from the entire header section to the drum by way of the return circulating tubes which are indicated as Location 11 in Figure 8. It was neces-

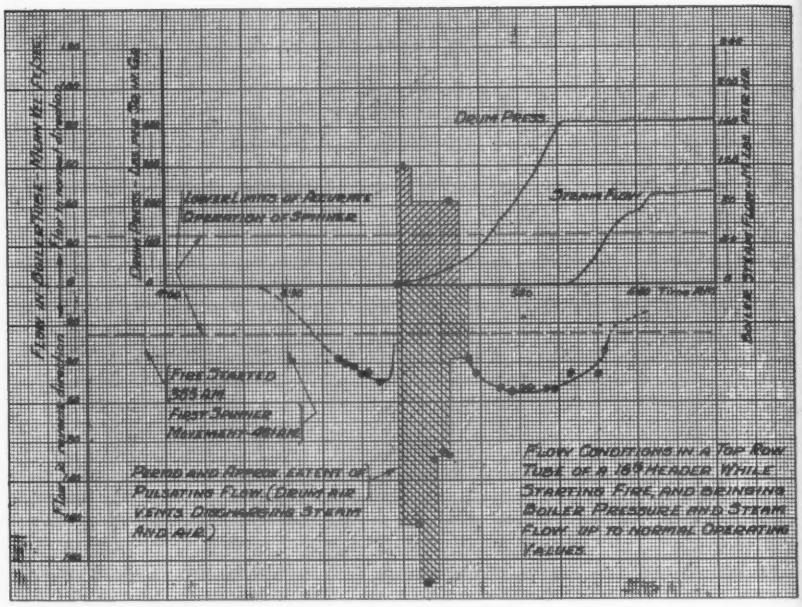

Drum Press.
Steam Flow
Upward Limit of Adverse Operation of Spinner
Fire Started 505 A.M. First Spinner Movement Again
Period and Approx. Extent of Pulsating Flow (Drum and Vents Discharging Steam and Air)
Flow Conditions in a Top Row Tube of a 18" Header While Starting Fire, and Bringing Boiler Pressure and Steam Flow up to Normal Operating Values.

*Fig. 11*

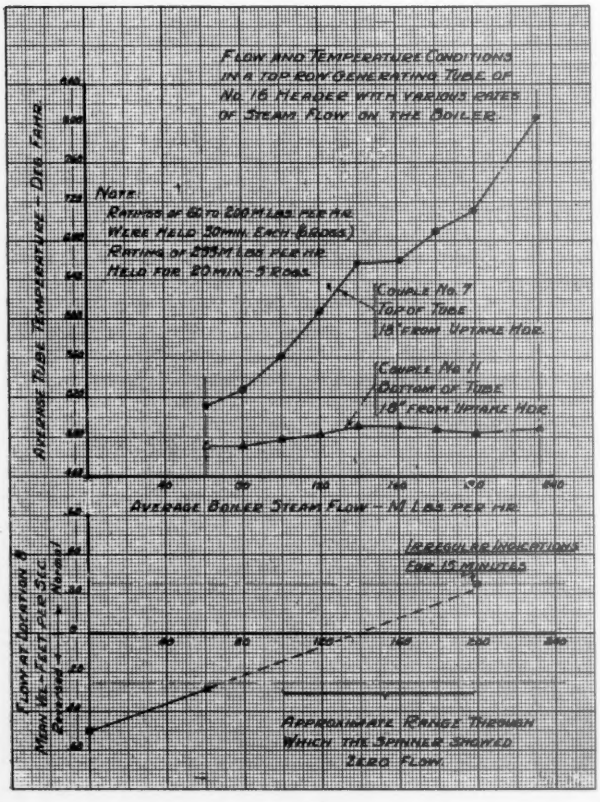
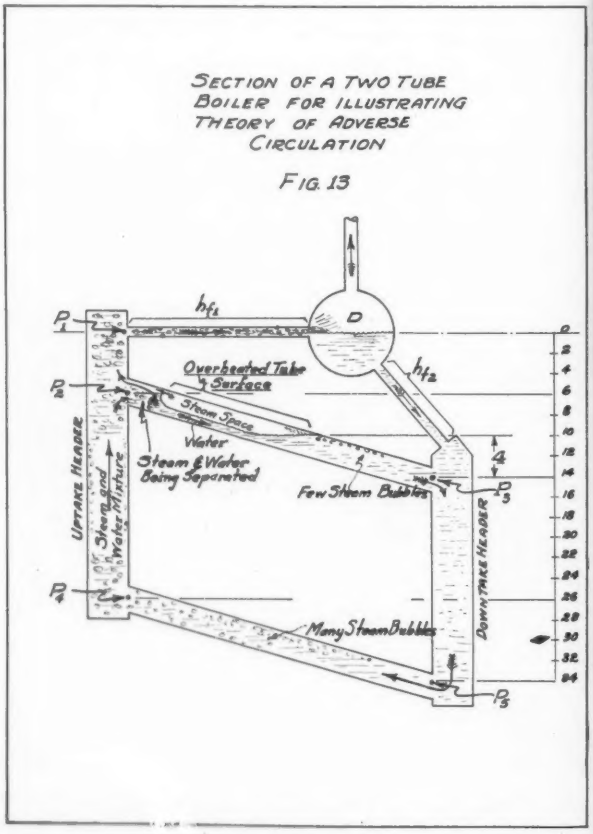

Flow and Temperature Conditions in a Top Row Generating Tube of No. 16 Header with Various Rates of Steam Flow on the Boiler.
Note:
Ratings of 60 to 200 M Lbs per Hr. Were Held 30 Min. Each. (4 Cons.)
Rating of 225 M Lbs per Hr. Held for 20 Min. - 5 Readings.
Couple No. 7 Top of Tube 18" from Uptake Hdr.
Couple No. 11 Bottom of Tube 18" from Uptake Hdr.
Reverse Tube Temperature - Deg. Fahr.
Average Boiler Steam Flow - M Lbs per Hr.
Irregular Indications for 15 Minutes
Approximate Range Through Which the Spinner Showed Zero Flow.

*Fig. 12*



sary to calculate rather than measure the velocity of the mixture of steam and water returning to the drum as the characteristics of the spinner when passing anything but water are unknown. The method which was used in calculating this average velocity in the return circulating tubes was as follows:

1. The steam generation was taken as 1/28 of the total generation of the boiler proper. (There are 28 headers.)
2. The volumetric conditions were obtained from steam tables. The drum pressure was used to determine the volume of the steam, and the saturation temperature corresponding to the drum pressure was used to determine the volume of the water.
3. The sum of the flow of steam and water in cubic feet per second was divided by 0.147 square feet (approximate area of the return circulating tubes), to obtain the velocity in feet per second.

The velocity as calculated by this method is tabulated under Location 11, Figure 8.

Some data were also obtained on flow conditions which existed during the period when the boiler was being put in service following outages for maintenance purposes, but with the exception of the data secured in the uppermost generating tube (Location 8, Figure 7), they were of little value as compared to those obtained under normal operating conditions.

### Interpretation of the Flow Data

These flow data resulted in the formation of a very definite theory of improper circulation which was verified in every respect by the pressure measurements that followed. This theory is best described by referring to Figure 13 which shows a section of a simplified straight tube boiler with two generating tubes. In this simplified circuit the vertical dimensions were chosen to make the section which is shown roughly proportional to the actual section of the boilers in question. The lower tube corresponds to the tubes nearest the fire and the upper tube corresponds to the top row tube of the upper deck. The following assumptions have been made in order to simplify the discussion.

1. The pressure drop due to frictional resistance to flow is confined to two parts of the circulating path, namely, the circulating tubes from the uptake header to the drum and the circulating tubes from the drum to the downtake header.
2. The mixture in the uptake header is uniform throughout the height of the header and is one-half as dense as water at the saturation temperature.
3. The head due to weight of steam in the steam space in the upper generating tube is neglected.

* Density of mixture = ½.

The pressures considered in this analysis are described as units of head of water at saturation temperature, the units being defined by the scale at the right of the figure. The steam flow rating at which this simplified boiler is operating is fixed, and the friction heads due to flow in the circulating tubes, designated as $h_{f1}$, and $h_{f2}$, have been evaluated as 5 and 2 units respectively. The high end of each tube is 8 units above the low end. The head available for circulation in either of the tubes can, therefore, be discovered by solving for the difference in end pressures.

Considering the lower tube first,

$$P_5 = D + 34 - h_{f_2} = D + 32$$
$$P_4 = D + (26 \times \tfrac{1}{2}^*) + h_{f_1} = D + 18$$
$$P_5 - P_4 = 14$$

Since $P_4$ need be only 8 units less than $P_5$ to maintain the tube full of water, and since the mixture in the tube has many steam bubbles and cannot be as heavy as water, there are at least 14 minus 8, or 6, units of pressure forcing circulation in the normal direction. From the viewpoint of circulation this tube should be perfectly safe. It is to be remembered that the lower rows of tubes in this type of boiler are rarely subject to failure where scale formation is no consideration.

Considering the upper tube,

$$P_3 = D + 14 - h_{f_2} = D + 12$$
$$P_2 = D + (6 \times \tfrac{1}{2}) + h_{f_1} = D + 8$$
$$P_3 - P_2 = 4$$

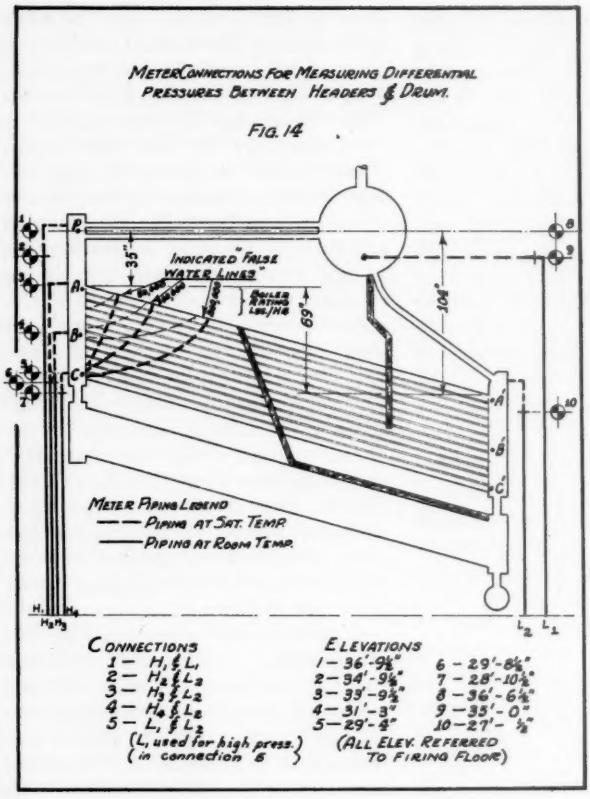
Since $P_2$ should be 8 units less than $P_3$ to maintain this tube full of water, and since the tube has a much lower steaming rate than the lower tube and, therefore, fewer steam bubbles, there will be almost 4 units of pressure attempting to force circulation in the reverse direction (i. e., from $P_2$ to $P_3$).

Consideration of the source—the uptake header—from which this reverse flow must come if it is to be maintained, reveals the possibility of having a stagnant steam space in the high end of the boiler tube. As the steam-water mixture flows into the tube from the uptake header the water does not become immediately separated from the mixture, and consequently this separation process takes place within the tube approximately as indicated in Figure 13. This permits the steam from the mixture, as well as the small amount generated in the tube, to flow back into the uptake header. The amount of water resulting from this separation process is very limited in quantity, as the steam-water mixture in the uptake header is relatively dry. Therefore, even though there is flow into the tube, its effect in eliminating the stagnant steam space is very small, especially since the tube is open at the low end and, therefore, can allow the amount of water supplied to it to flow into the downtake header. Thus the level to which this tube fills with water is a function of the pressures at the ends of the boiler tubes as well as of the heat applied by the furnace. It can be seen, however, that if the steaming rate of the low end of a stagnant tube were increased sufficiently, or if by some other means the small quantity of steam actually generated could be made to have a sufficient lightening effect on the resultant mixture, the level of this mixture would rise to the high end of the tube in spite of the deficient pressure differential on the tube, provided, of course, in the example just given, the differential pressure were not less than the weight of a column of steam eight units high.

Consideration of this same simplified boiler with a variable instead of a fixed steaming rate, reveals that overheating in the top tube probably becomes worse with increased ratings because the friction head at $h_{f1}$ will naturally increase with increased flow and, therefore, lower the water level in this tube still further. The only counteraction existing under variable steaming rates is the lightening of the fluid in the uptake header with increased ratings. This would tend to decrease the pressure at the high ends of both tubes, but the proximity of the upper tube to the drum level would hardly permit this improvement to be of sufficient amount at the upper tube outlet to counteract completely the effect of the increased friction.

As revealed by the flow data, the principal facts that confirmed the theory described above are as follows:

1. The flow in the uppermost generating tubes was found to be coming from the uptake header when the steam flow rating on the entire boiler was below 25 per cent of the maximum. See Figure 11 and the lower scale of Figure 12.
2. The temperature of the upper side of the high end of the uppermost tube was found to increase with the steam flow rating on the boiler, while the temperature of the lower side just opposite the temperature measuring point in the high side was found to remain reasonably close to the temperature corresponding to the boiler pressure. This indicated a small stream of water flowing through what was otherwise a steam space in the tube. See the upper scale of Figure 12.
3. When the steam flow rating on the boiler was less than 25 per cent of the maximum the total inflow into the upper bank from the downtake header was a negative quantity; that is, more water was



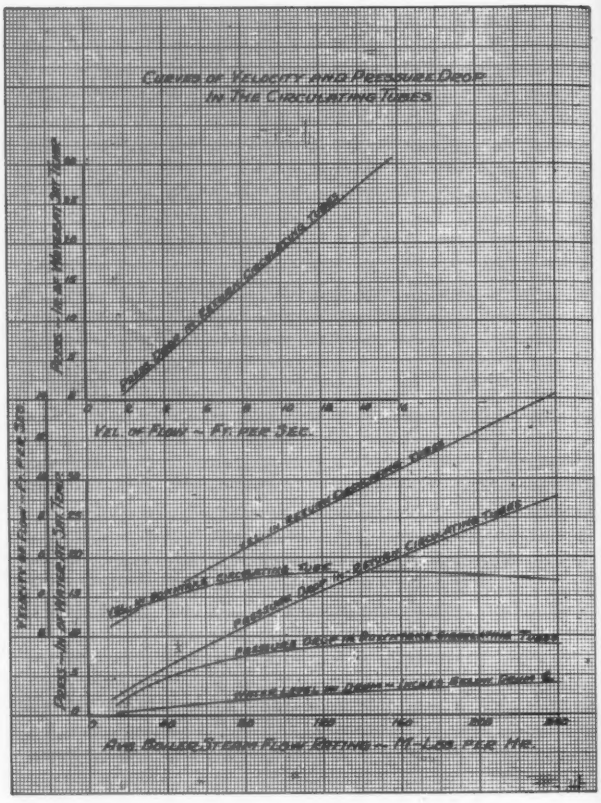


Curves of Velocity and Pressure Drop in the Circulating Tubes
Vel. of Flow — Ft. per Sec.
Rate Boiler Steam Flow Rating — M-Lbs. per Hr.

*Fig. 16*

coming into the upper tube bank from the uptake header than from the downtake header. See tabulation under Location 10, Figure 8.

4. The total flow of water into the entire header section was greatest when the boiler was operated at about fifty per cent of its maximum steaming rate. Above this rating the flow into the header decreased, and this would indicate that the friction in the circulating tubes was of sufficient magnitude to reduce the rate of circulation even though the boiler output was considerably increased. See Figure 9.

### Pressure Relations Accompanying Boiler Circulation

The development of the theory of adverse pressure conditions, which is illustrated in Figure 13, naturally made it desirable to know the pressures existing in the boiler header section in which the flow had been measured. A recording differential pressure gauge was, therefore, employed on five sets of connections to this header as illustrated in Figure 14. The data obtained made possible the calculation of the differential pressure between the following points, also shown in Figure 14, in terms of inches of water at a temperature corresponding to the boiler pressure:

**Connection 1**—Between Point P and the drum
**Connection 2**—Between Point A and the drum

| Boiler Steam Flow Rating M#/Hr. | Pressure Above Drum Pressure — Uptake Hdr. Inches of water at Sat. Temp. | | | Pressure Above Drum Pressure — Downtake Hdr. Inches of water at Sat. Temp. | | | Pressure Exerted by Mixture in Tube Inches of water at Sat. Temp. | | | Inches of Steam Space if Water Below Steam Space Contained No Steam Bubbles | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A′ | B′ | C′ | A′-A | B′-B | C′-C | Top row | 7th row | 12th row |
| Col.→ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 20 | 31.6 | 61.9 | 82.3 | 101.2 | 130.2 | 154.2 | **69.6 | 68.3 | 71.9 | * | 2.8 | -2.9 |
| 40 | 33.2 | 60.4 | 79.1 | 98.3 | 127.3 | 151.3 | 65.1 | 66.9 | 72.2 | 14.9 | 8.2 | -3.2 |
| 60 | 34.1 | 59.8 | 77.2 | 96.3 | 125.3 | 149.3 | 62.2 | 65.5 | 72.1 | 26.0 | 13.7 | -3.1 |
| 80 | 35.0 | 59.6 | 76.2 | 94.8 | 123.8 | 147.8 | 59.8 | 64.2 | 71.6 | 35.2 | 18.8 | -2.6 |
| 100 | 35.9 | 60.2 | 75.6 | 93.7 | 122.7 | 146.7 | 57.8 | 62.5 | 71.1 | 42.9 | 25.5 | -2.1 |
| 120 | 37.1 | 60.8 | 75.5 | 92.9 | 121.9 | 145.9 | 55.8 | 61.1 | 70.4 | 50.5 | 31.0 | -1.4 |
| 140 | 38.2 | 61.3 | 75.3 | 92.1 | 121.1 | 145.1 | 53.9 | 59.8 | 69.8 | 57.8 | 36.1 | -.8 |
| 160 | 39.3 | 62.2 | 75.5 | 91.6 | 120.6 | 144.6 | 52.1 | 58.4 | 69.1 | 64.6 | 41.6 | -.1 |
| 180 | 40.9 | 63.2 | 76.0 | 91.3 | 120.3 | 144.3 | 50.4 | 57.1 | 68.3 | 71.1 | 46.7 | 2.8 |
| 200 | 42.4 | 64.2 | 76.4 | 91.0 | 120.0 | 144.0 | 48.6 | 55.8 | 67.6 | 78.0 | 51.8 | 5.5 |
| 220 | 44.0 | 65.4 | 77.2 | 91.0 | 120.0 | 144.0 | 47.0 | 54.6 | 66.8 | 84.0 | 56.5 | 8.6 |
| 240 | 45.6 | 66.5 | 78.0 | 91.0 | 120.0 | 144.0 | 45.4 | 53.5 | 66.0 | 90.3 | 60.8 | 11.8 |

* Sample Calculation: $(69"-65.1") \times \frac{22 \times 12"}{69"} = 14.9"$

** This value apparently in error — should be approx. 68"

† Vertical head inches of hot water above upper end of tube.

*Fig. 15—Tabulation of measured pressures affecting circulations in upper bank of generating tubes*

**Connection 3**—Between Point B and the drum
**Connection 4**—Between Point C and the drum
**Connection 5**—Between the Drum and the top of the downtake header

Points A, B, and C are at the high ends, and Points A′, B′, and C′ are at the low ends of the first, seventh, and twelfth row tubes respectively. The differential pressure between the drum and each of the Points A′, B′, and C′ was determined by using the data obtained from Connection 5 and by assuming the friction drop from the top of the downtake header to Point C′ to be zero. This assumption is felt to be justified because of the relatively low velocities that obtain here.

The measured and calculated values of the pressures thus obtained at the six Points A, B, C, A′, B′, and C′, are tabulated in Columns 1 to 6, inclusive, of Figure 15, and the data in Columns 7

to 12, inclusive, were calculated from these pressures. Columns 7, 8, and 9 are merely the differences of the end pressures of the first, seventh, and twelfth row tubes. Because of the fact that the high end of each of these tubes is 69 inches above its low end, the amount by which the differential pressures tabulated in Columns 7, 8, and 9, differs from 69 inches is a partial indication of the advantage or disadvantage under which these tubes were operating in respect to circulation. That is, if any one of these tubes is to have circulation from the downtake to the uptake header, the pressure exerted by the column of mixture in that tube must be less than the differential pressure between the ends of that tube. If this condition is not satisfied, a tendency toward reverse circulation will result, and a steam space will exist in the tube when a state of hydrostatic balance develops.

To provide a mental picture of the length of the steam space formed when the tendency for reverse circulation obtains, calculations were made from the data in Columns 7, 8, and 9, and are tabulated in Columns 10, 11, and 12 of Figure 15. To clarify this picture of adverse pressure conditions, heavy dotted lines have been drawn across the tubes of the upper bank illustrated in Figure 14 to show the theoretical level to which the water in these tubes would recede if it contained no steam bubbles. The light dotted lines shown indicate the approximate recession of the mixture in the tubes as indicated by the tube temperature data which were previously obtained. The distance between the points at which these light and heavy dotted lines intersect a given tube at a given rating will, therefore, indicate the relative steaming rate of that tube as compared to that of other tubes above or below it determined in the same manner.

### Methods of Preventing High Tube Temperatures Due to Poor Circulation in Straight Tube Boilers

Several methods were tried in an effort to secure satisfactory tube temperatures in these three boilers. The first of these methods was an attempt to readjust the flow in the entire header section by placing restrictions at various points in the downtake header. It was thought that the pressure at the low ends of the upper tubes might be increased sufficiently in this manner to afford them adequate circulation. However, the possibility of causing harmful restriction of the flow to the lower tube bank caused this method to be discontinued as soon as it was found that the small changes in area which were tried had a negligible effect on the temperatures of the overheated tubes. It is now apparent from the data that have been obtained regarding the pressure in the headers of these boilers that the above described method of readjusting circulation could hardly provide satisfactory conditions for the top row tubes without dangerously restricting circulation to the lower tube bank.

The next step in the experimentation was an effort to reduce the temperature of the overheated tubes by placing restricting orifice plugs in their low ends. The decision to try this method resulted from the report of its successful application in a European boiler of similar design. This report, previously referred to, is published in the August 31, 1931, issue of "Engineering".

The theory involved was that the flow of water from the uptake header into the high end of the overheated tubes had sufficient velocity to entrap steam just inside the tube outlet. This "pocket" or "bubble" of steam grew to considerable length before it was partially discharged into the header, and, therefore, the tube became overheated at the point where this "steam pocket" formed. The function of the orifice plug, therefore, was to reduce the velocity of the water flowing into the high end of the tube by limiting the outflow at the low end. This reduction of the velocity down the tube would then allow the steam formed to discharge normally. The European experimenters, who reported on this method, evidently regarded the steam-water mixture in the uptake header as a source from which a large amount of water could flow into the high ends of the overheated generating tubes. They apparently also concluded that reverse circulation was not an objectionable feature unless it was of such high velocity as to prevent the steam generated in the tube from passing easily into the uptake header.

When the orifice plugs were tried in the boilers described in this paper, the results obtained did not appear to conform to this theory. The orifice plugs that were most efficient in keeping the tube temperatures normal had very small openings, but solid plugs which had no orifice at all were even more efficient than these. But even with these solid plugs installed the inflow at the high end of some overheated tubes (when operating at high steam flow ratings), was apparently scarcely equal to the steaming rate of the tubes, for in one instance a solidly plugged tube suddenly developed an extremely high temperature when the boiler was operating at a steam flow rating near the maximum.

The theory, now believed to be correct, regarding the function of the orifice plug, is that it merely limits the outflow of water from the tube until the inflow minus the outflow is greater than the amount of steam generated in the tube, thus allowing the tube to fill with water.

Obviously, if the steaming rate of a tube, which has an orifice or solid plug in its low end, is made to exceed the inflow of water at the high end, the plug in the low end becomes a dangerous appliance, for it may allow the tube to become completely dry.

Further consideration of the character of the steam water mixture in the uptake header illustrates from another viewpoint why restricting plugs should not be used in the low end of generating tubes which are subjected to overheating. The steam-water mixture is relatively dense when the steam flow rating on the boiler is low, but when the rating is forced to values which are near the maximum the steam-water mixture in the uptake header becomes fairly light, and consequently much less water per unit of volume would be available to the upper row tubes. Therefore, if a tube is dependent on this source for its water supply, it will have the least adequate source of supply when it requires the most water.

Another questionable feature of restricting plugs is the tendency of tubes in which such plugs are installed to fill up with the solids that normally would pass into the mud drum of the boiler. Because of this and the other objectionable features discussed above, restricting plugs were discarded as a method of securing satisfactory tube temperatures in these boilers.

The next and final effort to provide suitable cooling for the overheated tubes proved successful. This, as mentioned before, consisted of placing tubular cores within the tubes, one core being required for each tube that was subject to overheating. Since these cores have been installed in the three boilers, there have been no tube replacements and no indication that tube replacements will ever be necessary.

The action of the core in cooling the tube appears to result from two sources, though there may be others. The first action results from the provision of an annular steam and water space of relatively small cross-sectional area, thus increasing the surface velocities on the

inner side of the tube and so materially increasing the heat transfer rate. The other action is that of decreasing the volume of water in the tube, i.e., outside of the core, to a point where the volume of steam generated can render the resultant mixture sufficiently light to completely fill the tube, and thus provide circulation in the normal direction in spite of the adverse pressure conditions at its ends. This latter action is obviously the more important of the two. In describing the effect of the cores it may be said that by their use a new volumetric ratio of steam to water is established which is more nearly like that which exists in uncored tubes having higher steaming rates. In other words, placing cores in large tubes having low steaming rates increases their "pumping efficiency" as viewed from the air lift principle, and thereby permits them to circulate water in the proper direction.

The selection of the proper lengths and diameters of the cores for these boilers required considerable experimentation. The final installation consisted of two diameters of cores, both 18 feet long. In the two upper rows the cores used were 2¼ inches O.D. In the next four rows the cores were 1.9 inches O.D. The internal diameter of the 3 inch No. 8 B.W.G. boiler tubes, in which the cores are installed, is approximately 2.60 inches.

**Factors Involved in the Loss of Tube Metal**

The chemical and thermal actions that cause metal to be removed from the inner surface of overheated tubes, as illustrated by Figure 2, are thought to be of sufficient interest to justify a short discussion here.

The appearance of the tubes at the points where corrosion has taken place, and the presence of magnetic iron oxide scale in them, indicate that the principal cause of the corrosion is the ordinary reaction between steam and heated iron which results in the liberation of hydrogen. However, the relatively deep line of corrosion existing along the tube wall just above the line of "rope scale" suggests the possibility of another action, the basis for which may be found in an article by George A. Orrok.* In this article Mr. Orrok describes calculations which show that under certain conditions of temperature in the walls of a boiler tube the outer fibers of the tube wall are expanded to a point where they are not only relieved of tensile stress from boiler pressure within the tube but are actually placed in compression. The result is that the fibers of the inner side of the tube wall not only carry all the tensile stress due to the boiler pressure but also have added tensile stress imposed on them by the expansion of the fibers in the outer wall of the tube. If the sum of the stresses imposed on the inner tube wall is in excess of the creep limit of the steel, the innermost surface of the tube wall will slough off and be lost.

The occurrence of excessive tensile stresses in localized areas of those tubes which are subjected to the conditions found in the upper tube bank of these boilers does not seem improbable. But it appears that the reaction of steam and heated iron is the major factor in the corrosion that results. The destructive effects of this reaction are, no doubt, greatly hastened just above the water line in the tube by the "cracking off" of the oxide scale due to the temperature changes which occur when the area is alternately exposed to steam and water. This would cause a fresh iron surface to be intermittently open to attack along the tube in approximately the same location as the line of deep corrosion which is shown in Figure 2.

**Conclusions**

Serious accidents, excessive maintenance, and unwarranted shutdowns have often been caused by lack of adequate circulation of the water in boilers. This shortcoming has not been confined to any one type or design of boiler but is characteristic of a general condition that has developed as a result of the demand for increased steam output from each unit of boiler heating surface.

One of the major difficulties that have interfered with the study and understanding of circulation in boilers has been the lack of satisfactory measuring equipment, for, as Lord Kelvin said, "Until we can measure we do not know."

The use of thermocouples, an electrical spinner, and a differential pressure recorder, as described in this article, provides a simple, effective and fairly accurate means of determining the hydraulic conditions that are encountered in the circulation of water and steam in boilers.

The data obtained from the use of equipment of this nature may be developed so as to give information on the pressure and quality of the steam-water mixture in tubes and headers of a boiler. Data on the amount, the direction, and the velocity of the flow that is taking place in the tubes and headers are also made available.

With information of this nature available, it will be possible to study the hydraulic characteristics of the circulatory system of boilers and, consequently, to design them for adequate circulation with the same degree of certainty that, for example, plates and tubes of the proper thickness can now be selected for the boiler material.

The installation of internal cores in tubes of the upper bank of the boilers under discussion in this article was successful in overcoming the circulation trouble, and consequently solved the maintenance problem for this battery of boilers. It is to be understood, however, that this procedure is advocated only as a cure in the event that inadequate circulation is encountered.

It seems reasonable that in boilers which are designed for natural circulation the flow of water into any generating tube should not be regarded as ade-

(*Continued on page* 404)

* High Pressure Steam Boilers—Trans. A.S.M.E., 1928, FSP-50-32.

## First Prize!

WINNING of first prize in the James H. McGraw Contest, sponsored by the Edison Electric Institute, by an employee of Northern States Power Company, R. M. Hanson, is extremely significant in view of the fact that Mr. Hanson was the only employee of that company who submitted a paper for any of the awards offered this year. This was despite the fact that, according to Charles F. Stuart, assistant to the president, every manager and department head was advised of the contests, and placards and posters were conspicuously displayed all over the property.

Mr. Stuart feels that in his company —and undoubtedly in others there is justification for the same feeling—for few papers were submitted this year —employees are held back from entering these contests by a sort of inferiority complex. He thinks they say to themselves, "What chance have I, an inconspicuous employee in this company, of winning in a national contest?"

Mr. Hanson's well deserved success should dissipate the notion that other companies have smarter people than ourselves. "Our chances are as good as anybody's," employees should now be convinced, and act on the theory that it is better to try and fail than not to try at all. It is always possible to try again, and the seasoned contestant will have the benefit of his previous experience.

Congratulations to Mr. Hanson for winning the prize, and thanks to him for demonstrating that people in this organization can do it! More entries next year should be the result.—*Byllesby Management.*

# Institute Contributes Data for Nation-Wide Government Ownership Debate

IN APRIL of this year the Edison Electric Institute, along with various other organizations, was advised by the Committee on Debate Materials and Interstate Cooperation of the National University Extension Association that the subject chosen by that association for the coming year's debate by high school and college students in most of the states of the Union was "Resolved, That all electric utilities should be governmentally owned and operated."

The debate question is chosen each year by the association after considering suggestions solicited from the high school debaters. Last year's question was "Resolved, That the several states should enact legislation providing for a system of complete medical service available to all citizens at public expense." It was estimated by the committee that this year's debate will be participated in by more than 100,000 debaters discussing the proposition from the platform and over the air.

The Committee on Debate Materials requested material to be used in preparation of its official Debate Handbook and for inclusion in the supplement to the official Handbook which it also publishes. It also invited the Institute to supply additional debate material on the negative side of the proposition for distribution by it through its state agencies to the various debating teams in accordance with the established practice of the committee. All material to be offered required the approval of the committee. It was explained that the same invitation was being extended to other organizations "distinctly favorable to public ownership and to complete socialization of the electric industry" and also to other organizations favoring private enterprise.

The Institute accepted the invitation to supply basic material on the negative side of the debate, and it has prepared for that purpose a reference work entitled "The Case for Private Ownership of Electric Utilities." The Institute has also made available to the Committee on Debate Materials other supplementary publications giving factual information on the electric light and power industry and on government ownership.

"The Case for Private Ownership of Electric Utilities" and the supplementary material have been made into sets and shipments are being made, on approved requisitions of the Committee on Debate Materials, to some thirty-five of its state agencies for distribution to the various debating teams. Shipping instructions for more than five thousand sets of the material had been received by September 10th.

"The Case for Private Ownership of Electric Utilities" was carefully prepared and every effort was made to give an accurate presentation of provable facts. It represents data gathered from thousands of official reports, papers, books and other publications. It is well documented with references, and it is believed that in addition to its original purpose it will fill a long-felt need of the Institute for a concise reference work to aid in answering many of the inquiries which come from individuals, business organizations and civic associations.

The ten chapters in the book cover the following subjects:

The Advantages of Private Enterprise Over Government Management of Business.

Electric Power Supply Not a Problem in America.

The Record of the Electric Light and Power Industry.

Public Ownership of Utilities in America.

Power Ventures in Other Countries.

Experience of Governments in Other Lines of Business.

Rate Comparisons Between Privately and Governmentally Owned Utilities.

Regulation is Preferable to Government Ownership.

Accusations Against the Electric Light and Power Industry—And the Answers.

Exaggerated Claims for Government Ownership—And the Answers.

The supplementary material referred to previously is published in a series of pamphlets and includes the following titles:

S-1 The Electric Light and Power Industry in 1935—(EEI Statistical Bulletin No. 3).

S-2 The Fallacy of Government Ownership—Facts on Government Ownership and Operation of Electric Power and Light Utilities, by Clarence R. Wharton.

S-4 Government Ownership of Public Utilities—With Special Emphasis on Municipal Operation of Electric Utilities.

S-5 Historical Survey of Ventures of State and Federal Governments into Business prior to 1933, by W. J. Hagenah and W. M. Persons.

S-6 Government and Business (Articles by various authors.)

S-7 Comparison of Municipal and Company Rates—Based on the Electric Rate Survey of the Federal Power Commission.

S-8 United States Leads in Rural Electrification, by H. S. Bennion; Rural Electric Service in Ontario, by Wm. M. Carpenter.

S-9 Taxes and the Public Utilities (Articles and data from various sources.)

S-10 The TVA (Articles by various authors.)

S-11 Financial Crisis Faces Ontario Hydro Electric System; Early Plans—Later Experience, by H. S. Bennion.

S-12 Regulation of Public Utility Companies, by Richard T. Higgins.

S-13 The Electric Utilities and Public Regulation, by Wm. J. Hagenah.

S-14 Findings of the Federal Trade Commission, by Bernard F. Weadock.

Individual copies of "The Case for Private Ownership of Electric Utilities" may be purchased for 25 cents; in quantities of 100 or more the price is 10 cents per copy. The complete set of material including "The Case for Private Ownership" is priced at 50 cents per set, in any quantity, transportation charges collect.

# H. W. Fuller

H. W. FULLER, vice president in charge of engineering and construction, Byllesby Engineering and Management Corporation, died suddenly while on a vacation at Basswood Lake, Minn., August 28th. Born in New York, Mr. Fuller entered the electrical industry immediately after graduation from Rutgers, his first work being in connection with the electrification of the horse car lines at Paterson, N. J., in 1891 and 1892.

He became associated with the General Electric Company, subsequently entered the transportation field and in 1901 was made general manager of the Washington Railway and Electric Company and the Potomac Electric Power Company, the position he occupied until 1911, when he joined the Byllesby organization.

He served successively as vice president and general manager of Appalachian Power Company, Bluefield, W. Va.; vice president of Louisville Gas and Electric Company; in the Chicago office of Byllesby; vice president in charge of operation, Northern States Power Company, and since 1924 vice president in charge of engineering and construction of Byllesby Engineering and Construction Corporation. He was also a vice president and director of Standard Gas and Electric Company and a director of several Byllesby properties.

# PAPERS ENTERED IN 1936 PRIZE CONTEST TO BE LOANED

The BULLETIN publishes below and on following pages a list of the papers and exhibits entered in the 1936 Prize Awards competition. With the exception of the prize-winning papers (which, in so far as may be practicable, are to be published in the BULLETIN during the year), and the entries for the Coffin, Curtis and Hughes Awards which may be inspected at the general offices, the Institute will be glad to loan to any member company or individual any of the papers listed. Application for loans of papers should be made to The Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y. Requests for loans will be filled in the order of receipt.

## PRIZE WINNING PAPERS

### H. M. Byllesby Prizes

*First Prize*—H. D. Anderson, American Gas and Electric Company, New York, N. Y.
*Second Prize*—Charles L. Betts, Jr., Westchester Lighting Company, Mount Vernon, N. Y.
*Third Prize*—Walter Bergmann and Henry G. Wingardner, New York Edison Company, Inc., New York, N. Y.

### B. C. Forbes Prize

*Cash Prize*—Louis F. Conti, Westchester Lighting Company, Mount Vernon, N. Y.

### A. L. Lindemann Prizes

*First Prize*—Miss Mayme E. Miller, Minnesota Power and Light Company, Little Falls, Minn.
*Second Prize*—Mrs. Edna Parrish, Utah Power and Light Company, Salt Lake City, Utah
*Third Prize*—Miss Ruth W. Williams, Detroit Edison Company, Detroit, Mich.

### James H. McGraw Prizes

*First Prize*—R. M. Hanson, Minneapolis General Electric Co., Minneapolis, Minn.
*Second Prize*—Elwood A. Church, Edison Electric Illuminating Company of Boston, Boston, Mass.
*Third Prize*—Wallace C. Rudd, New York Edison Company, Inc., New York, N. Y.

## PAPERS SUBMITTED BY THE FOLLOWING COMPANIES FOR THE COFFIN, CURTIS AND HUGHES AWARDS ARE AVAILABLE FOR INSPECTION AT THE EDISON ELECTRIC INSTITUTE

(*This Group won prizes or honorable mention*)

### Charles A. Coffin Award

*Gold Medal*—Idaho Power Company, Boise, Idaho

### Augustus D. Curtis Award

*Certificate*—Metropolitan Edison Company, Reading, Pa.

*Cash Award*—E. J. Ingram

### George A. Hughes Award

*Cup*—Kingsport Utilities, Inc., Kingsport, Tenn.

*Cash Award*—J. E. Wright

*(Other entries for Coffin, Curtis and Hughes Awards)*

### Charles A. Coffin Award

Mississippi Power Company, Gulfport, Miss.
Northern Indiana Public Service Company, Hammond, Ind.
The Milwaukee Electric Railway and Light Company, Milwaukee, Wis.

### Augustus D. Curtis Award

Philadelphia Electric Company, Philadelphia, Pa.
Indianapolis Power and Light Company, Indianapolis, Ind.
New York State Electric and Gas Company, Endicott, N. Y.
Kansas Gas and Electric Company, Wichita, Kan.
South Carolina Power Company, Charleston, S. C.
The Washington Water Power Company, Spokane, Wash.
Taunton Municipal Lighting Plant, Taunton, Mass.
Sioux City Gas and Electric Company, Sioux City, Iowa
Alabama Power Company, Birmingham, Ala.
Commonwealth Edison Company, Chicago, Ill.
The Union Gas and Electric Company, Cincinnati, Ohio
Northwestern Public Service Company, Huron, S. D.
Compania Barcelonesa de Electricidad, Barcelona, Spain
Buffalo Niagara and Eastern Power Corp., Buffalo, N. Y.
Lynn Gas and Electric Company, Lynn, Mass.
The Cleveland Electric Illuminating Company, Cleveland, Ohio
Jersey Central Power and Light Company, Asbury Park, N. J.
Pennsylvania Power and Light Company, Allentown, Pa.

### George A. Hughes Award

Florida Power and Light Company, Miami, Fla.
New York State Electric and Gas Corp., Mechanicville, N. Y.
Northwestern Public Service Company, Huron, S. D.
The California-Oregon Power Company and Mountain States Power Company, Medford, Ore.
Durham Public Service Company, Durham, N. C.
Florida Public Service Company, Orlando, Fla.
Staten Island Edison Corp., Staten Island, N. Y.
New Jersey Power and Light Company, Dover, N. J.
Tennessee Electric Power Company, Chattanooga, Tenn.
Pennsylvania Power and Light Company, Allentown, Pa.
Public Service Company of New Hampshire, Manchester, N. H.
Mesilla Valley Electric Company, Las Cruces, N. M.
Idaho Power Company, Boise, Idaho.
Lake Superior District Power Company, Ashland, Wis.
Portland General Electric Company, Portland, Ore.

# PAPERS WHICH WILL BE LOANED TO MEMBERS

| *Submitted by* | *Employed by* | *Title of Paper* |
|---|---|---|
| Adams, Harold E. | Narragansett Electric Co., Providence. R. I. | "The Engineering Accountant" |
| Allen, Charles R. | Public Service Co. of Colorado, Denver, Colo. | "Your Goodwill Ambassadors—Your Employees" |
| Ames, Walter C., Jr. | Public Service Electric and Gas Co., Kearny, N. J. | "The Useful Life of Turbine Oils" |
| Armstrong, L. C. | Twin State Gas and Electric Co., Hoosick Falls, N. Y. | "Public Relations" |
| Bailey, Mrs. Mary S. | Georgia Power Co., Macon, Ga. | "Public Relations in the Electric Light and Power Industry" |
| Baldwin, C. M. | Minnesota Power and Light Co., Duluth, Minn. | "Public Relations" |
| Barbera, Emanuel J. | New York Edison Co.. Inc., Bronx, N. Y. | "The Psychology of Public Relations" |
| Barrows, K. C. | Minnesota Power and Light Co., Eveleth, Minn. | "Advantages of Electric Cookery for Domestic Purposes" |
| Beal, Alice R. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "The Advantages of Electrical Cookery" |
| Beauchemin, Jos. O. | Shawinigan Water & Power Co., Thetford-Mines, Que. | "Public Relations" |
| Berg, Camillo | New York Edison Co., Inc., New York, N. Y. | "An Untold Drama" |
| Blair, Granville | Hartford Electric Light Co., Hartford, Conn. | "Advantages of Electric Cookery for Domestic Purposes" |
| Blount, May | San Diego Consolidated Gas & Electric Co., San Diego, Cal. | "Public Relations" |
| Boning, Jeanne M. | Edison Electric Illuminating Co., Boston, Mass. | "It's a Snap" |
| Borden, Alan O. | General Electric Company, Portland, Ore. | "Electric Cookery: The Modern Method for Modern Home-Makers" |
| Boyd, D. T. | Empire District Electric Co., Joplin, Mo. | "Control of Domestic Water Heater Load by Operation of the Electric Range Element Switches" |
| Brewer, N. M. | Utica Gas and Electric Co., Utica, N. Y. | "Street Lighting Experience" |
| Brown, Mrs. J. C. | Keokuk Electric Co., Keokuk, Iowa | "Advantages of Electric Cookery for Domestic Purposes" |
| Brown, Walter E. | Narragansett Electric Co., Providence, R. I. | "The Value of a Safety Program in Strengthening Public Relations" |
| Bruce, A. J. H. | Bell Telephone Co. of Canada, Brantford, Ont. | "Representing Our Company" |
| Buckingham, A. E. | Washington Water Power Co., Lewiston, Idaho | "Men and Public Relations" |
| Bugbee, Ralph J. | Central Vermont Public Service Corp., Rutland, Vt. | "Public Relations for Utilities" |
| Bullock, James E. | Narragansett Electric Co., Providence, R. I. | "Service and Organization Spirit Means Better Public Relations" |
| Burnett, Newton O. | New York & Queens Electric Light and Power Co., Flushing, N. Y. | "Long Term Forecasting of Distribution System Investment" |
| Canfield, Nell | Lake Superior District Power Co., Askland, Wis. | "Public Relations in the Electric Light and Power Industry" |
| Carey, James N. | Narragansett Electric Co., Providence, R. I. | "Self-Expression" |
| Carlisle, June | Gulf States Utilities Co., Beaumont, Tex. | "Advantages of Electric Cookery for Domestic Purposes" |
| Carter, Leroy G. | Potomac Edison Co., Hancock, Md. | "Let the Olive Branch Grow Thorns" |
| Cavarly, Haywood P., Jr. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "An Experimental Air Conditioning Installation" |
| Caywood, Russell E. | West Penn Power Co., Pittsburgh, Pa. | "The Electric Utility—A Monopoly or Competitive Business?" |
| Chadwick, Jack R. | Florida Power and Light Co., W. Palm Beach, Fla. | "For Better Public Relations in the Electric Utility Business" |
| Chase, Cladd H., and August E. Munich | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Accounting Requires Engineering" |
| Clark, L. V. | Milwaukee Electric Railway & Light Co., Milwaukee, Wis. | "All Electric Heating" |
| Clement, Robert | New York Edison Co., Inc., New York, N. Y. | "Alice in Waat-A-Land" |
| Clement, Robert | New York Edison Co., Inc., New York, N. Y. | "The Road to Good Will" |
| Cloyes, Corrie J. | Philadelphia Electric Co., Philadelphia, Pa. | "Electric Cookery in the Dawn of Renaissance" |
| Cotty, W. J., Jr. | Suburban Gas and Electric Co., Revere, Mass. | "Beau Geste" |
| Cournoyer, H. | Shawinigan Water and Power Co., Montreal, Can. | "He Deserves Most Who Serves Best" |
| Coursey, R. W. | Oklahoma Gas and Electric Co., Oklahoma City, Okla. | "The Duties, Characteristics and Training of Qualifying Engineers in the Service of Public Utility Organizations" |
| Courtney, Edward M. | Niagara, Lockport and Ontario Power Co., Buffalo, N. Y. | "Public Relations" |
| Coyle, Walter E. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Crosby, Thomas N. | Nebraska Power Co., Omaha, Neb. | "Advantages of Electric Cookery for Domestic Purposes" |
| Daulbaugh, Charles M. | Potomac Edison Co., Cumberland, Md. | "Ten Keys to Happiness" |
| DelVecchio, Andrew | Commonwealth Edison Co., Chicago, Ill. | "Public Relations in the Electric Light and Power Industry" |
| Dengler, Fred K. | New York Edison Co., Inc., New York, N. Y. | "Public Relations" |
| Diehl, A. C. V., and R. L. Laudenslager | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Utility Public Relations—Their New Era of Importance" |
| Dillon, John A. | Narragansett Electric Co., Providence, R. I. | "Advantages of Electric Cookery for Domestic Purposes" |

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| *Submitted by* | *Employed by* | *Title of Paper* |
|---|---|---|
| Dinkins, Edna | Texas Electric Service Co., Fort Worth, Tex. | "Advantages of Electric Cookery for Domestic Purposes" |
| Duany, Harold R. | Westchester Lighting Co., Portchester, N. Y. | "Public Relations in Electric and Power Industry" |
| Dublin, Lewis | Brooklyn Edison Co., Inc., New York, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Ellsworth, John B. | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "Decentralization and Local Management" |
| Elmquist, Melvin L. | Detroit Edison Co.. Detroit, Mich. | "Public Relations in the Electric Light and Power Industry" |
| Emmerich, L. M. | Wisconsin Public Service Corp., Minocqua, Wis. | "Advantages of Electric Cookery" |
| Fekete, E. A. | Philadelphia Electric Co., Philadelphia, Pa. | "Responsibility of a Public Utility Employee" |
| Ferris, J. Harley | Washington Water Power Co., Lewiston, Idaho | "Advantages of Electric Cookery" |
| Ferris, J. Harley | Washington Water Power Co., Lewiston, Idaho | "Public Relations" |
| Fitzgerald, Raymond | Louisiana Public Utilities Co., Inc., Lafayette, La. | "Advantages of Electric Cookery for Domestic Purposes" |
| Fitzgerald, William A. | Gary Heat, Light and Water Co., Gary, Ind. | "The True Value of Good Public Relations" |
| Fleming, A. Eugene | Utah Power and Light Co., Salt Lake City, Utah | "Public Relations" |
| Flierl, May E. | Buffalo General Electric Co., Buffalo, N. Y. | "Advantages of Electric Cookery for Domestic Purposes" |
| Fluhr, Fred W., Jr. | New York & Queens Electric Light & Power Co., Richmond Hill, N. Y. | "Advantages of Electric Cookery for Domestic Purposes" |
| Forkner, Raymond H. | Tennessee Electric Power Co., Chattanooga, Tenn. | "Public Relations." |
| Gahnkin, Valentine G. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Applications of Testing and Research to Modern Steam Power Plant Operation" |
| Galt, O. P. | Georgia Power Co., Canton, Ga. | "Public Relations in the Electric Power and Light Industry" |
| Garner, C. L. | Puget Sound Power and Light Co., Vashon, Wash. | "Public Relations Personified" |
| Garrahan, Eva | New York & Queens Electric Light and Power Co., Long Island City, N. Y. | "Public Relations in the Electric Light and Power Company" |
| Grant, James F. | Public Service Electric and Gas Co., Harrison, N. J. | "Public Relations in the Electric Light and Power Industry" |
| Grimm, Ford A. | Pennsylvania Power and Light Co., Allentown, Pa. | "The Progress of Cooking" |
| Halloran, T. W. | New York Power and Light Corp., Albany, N. Y. | "Public Relations—A Complicated Problem or Simple Selling Job" |
| Harlan, E. E. | Virginia Electric and Power Co., Richmond, Va. | "Public Relations in the Electric Light and Power Industry" |
| Harley, Claire R. | Northern States Power Co., St. Paul, Minn. | "Public Relations in the Electric Light and Power Industry" |
| Harris, Franklin L. | New York Edison Co., Inc., New York, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Hayes, Edwin J. | Edison Electric Illuminating Co. of Brockton, Brockton, Mass. | "The Need for the Public Utility Accountant of Today" |
| Hebble, Howard E. | Public Service Electric and Gas Co., Newark, N. J. | "The Influence of Employee Relations on Customer Relations" |
| Hedges, R. J. | Stamford Gas and Electric Co., Stamford, Conn. | "Public Relations: Ailment and Remedy" |
| Heide, Charlotte | Illinois Northern Utilities Co., Dixon, Ill. | "Accounting" |
| Henry, J. D. | Duke Power Co., Marion, N. C. | "Advantages of Electric Cookery for Domestic Purposes" |
| Hickey, Joseph R. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Public Relations". |
| Hill, Raymond S. | Central Arizona Light and Power Co., Phoenix, Ariz. | "Public Relations in Electric Light and Power Industry" |
| Hocker, Harold B. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Rich Man—Poor Man" |
| Hogg, Robert W. | Atlantic City Electric Co., Atlantic City, N. J. | "Closer Relationship Between the Operating and Accounting Departments" |
| Hooks, Ruby | Oklahoma Gas and Electric Co., Ardmore, Okla. | "The Accounting Executive's Secretary" |
| Hughes, Mark E. | Idaho Power Co., Boise, Idaho | "Electric Cooking—Before and After" |
| Humphreys, C. G. R. | New York Edison Co., Inc., New York, N. Y. | "Economic History, Construction, Finance and Operation of the National Electric Power Scheme in Great Britain" |
| Irons, Audrey M. | Narragansett Electric Co., Providence, R. I. | "Advantages of Electric Cookery for Domestic Purposes" |
| Jannicelli, Frank P. | Public Service Electric & Gas Co., Newark, N. J. | "Public Relations in the Electric Light and Power Industry" |
| Jenks, T. C. | Puget Sound Power and Light Co., Seattle, Wash. | "Public Relations in the Electric Light and Power Industry" |
| Johnson, Charles | New York Edison Co., Inc., New York, N. Y. | "The Advantages of Electric Cookery" |
| Johnston, H. H. Paul | Bell Telephone Co. of Canada, Montreal, Can. | "Public Relations" |
| Johnston, William S. | Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y. | "This Day and Age" |
| Jones, Edward P. | Pacific Gas and Electric Co., San Jose, Cal. | "Public Relations" |
| Jones, Ralph E. | New York State Electric and Gas Corp., Endicott, N. Y. | "A Good Servant for a Very Small Salary" |

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| *Submitted by* | *Employed by* | *Title of Paper* |
|---|---|---|
| Jorgensen, Ragnvald | Shawinigan Water and Power Co., Montreal, Can. | "Eliminate So-Called Sleet Trouble on Transmission Lines" |
| Joyce, Richard J. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Bonds of Nature" |
| Kane, Henry F. | Northern States Power Co., Minneapolis, Minn. | "Good Cooks . . . . Are Heaven Sent" |
| Kelly, James F. | Public Service Electric and Gas Co., Newark, N. J. | "The Social Problem in Public Relations" |
| Kenney, Lawrence M. | Milwaukee Electric Railway and Light Co., Milwaukee, Wis. | "Advantages of Electric Cookery for Domestic Purposes" |
| Kerns, R. E. | Oklahoma Gas and Electric Co., Muskogee, Okla. | "Accent on Employee" |
| Kirkham, Richard P. | San Joaquin Light and Power Corp., Bakersfield, Cal. | "Streamlines" |
| Kirkland, Ruby | Pacific Gas and Electric Co., San Jose, Cal. | "Pleasing the Public" |
| Klein, Samuel | Public Service Electric and Gas Co., Orange, N. J. | "Obtaining and Sustaining Good Will" |
| Koch, H. Ferd. | Idaho Power Co., Boise, Idaho | "Electric Cookery the Modern Magic" |
| Kuhles, Rhea M. | Detroit Edison Co., Detroit, Mich. | "From an 'Electric Cooking Niece' " |
| Laplante, M. H. | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "Public Relations in the Electric Light and Power Industry" |
| Larson, Noble G., and E. L. Michelson | Commonwealth Edison Co., Chicago, Ill. | "Electrical Supply to Residential Air Conditioning Units in Metropolitan Centers" |
| Latour, Lawrence A. | Rockland Light and Power Co., Middletown, N. Y. | "Public Relations" |
| Laudenslager, R. L., and A. C. V. Diehl | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Utility Public Relations—Their New Era of Importance" |
| Leary, Margaret | New York & Queens Electric Light and Power Co., Woodside, N. Y. | "Advantages of Electric Cookery for Domestic Purposes" |
| Leary, Margaret | New York & Queens Electric Light and Power Co., Woodside, N. Y. | "Public Relations in the Electric Light and Power Company" |
| LeFebvre, Arthur F. R. | Public Service Electric and Gas Co., Trenton, N. J. | "Public Relations" |
| Levy, Leander C. | New York Edison Co., Inc., New York, N. Y. | "The Employee's Scope in Public Relations" |
| Linehan, Joseph P. | New York Edison Co., Inc., Bronx, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Link, Edward C. | Northern States Power Co., Galena, Ill. | "Advantages of Electric Cookery" |
| Lintemoot, G. B. | Michigan Gas and Electric Co., Decatur, Mich. | "Public Relations" |
| Lowrey, Wiley L. | Oklahoma Gas and Electric Co., Ada, Okla. | "Credits and Collections' |
| McCoart, Thomas | New York Edison Co., Inc., New York, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| McDowell, L. D. | Consumers Power Co., Battle Creek, Mich. | "Public Relations" |
| Kell, M. T. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Isolated Generating Plant or Public Utility Service" |
| McElravy, Robert J. | Ohio Power Co., East Liverpool, O. | "Public Relations as Viewed by the Public" |
| McGill, Lillian | Twin State Gas and Electric Co., St. Johnsbury, Vt. | "Electric Cookery for Domestic Purposes" |
| McQuade, Paul J. | Atlantic City Electric Co., Atlantic City, N. J. | "Cooperative Duty" |
| McQueary, Fred K. | Community Public Service Co., Ft. Worth, Tex. | "What Price Public Relations?" |
| Maple, Mrs. S. O. | Louisville Gas and Electric Co., Louisville, Ky. | "Electric Cookery" |
| Meister, A. G. | Commonwealth Edison Co., Chicago, Ill. | "The Forgotten Men" |
| Messerich, C. | Westchester Lighting Co., Yonkers, N. Y. | "Public Relations and the Credit Situation" |
| Meyer, Clestia | Oklahoma Gas and Electric Co., Oklahoma City, Okla. | "Advantages of Electric Cookery for Domestic Purposes" |
| Michelson, E. L., and Noble G. Larson | Commonwealth Edison Co., Chicago, Ill. | "Electrical Supply to Residential Air Conditioning Units in Metropolitan Centers" |
| Mikulski, John J. | Buffalo General Electric Co., Buffalo, N. Y. | "Electric Cookery" |
| Mitchell, Allan G. | Philadelphia Electric Co., Philadelphia, Pa. | "Goodwill Foundations" |
| Molaro, Carl | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Five Minutes on a Consumer's Premises" |
| Molesworth, G. H. | Kansas City Power and Light Co., Kansas City, Mo. | "Public Relations and Human Relations" |
| Moon, Georgia | Virginia Electric and Power Co., Norfolk, Va. | "One Increasing Purpose" |
| Moore, Ira C. | Gulf States Utilities Co., Caldwell, Tex. | "Public Relations" |
| Morey, Harold | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "The Marvel of Electric Time" |
| Morrison, James J. | Westchester Lighting Co., Mount Vernon, N. Y. | "Electricity—The Perfect Cooking Fuel" |
| Moses, Orrin J. | Lynn Gas and Electric Co., Lynn, Mass. | "Protection of Overhead Distribution Lines" |
| Munich, August E., and Cladd H. Chase | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Accounting Requires Engineering" |
| Murphy, John V. | Jersey Central Power and Light Co., Asbury Park, N. J. | "The Electric Range in the Average Home" |
| Murton, J. A. | Consumers Power Co., Battle Creek, Mich. | "Advantages of Electric Cookery for Domestic Purposes" |
| Nolan, John F. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Norris, Mary | Kansas City Power & Light Co., Kansas City, Mo. | "Advantages of Electric Cookery for Domestic Purposes" |

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| O'Grady, John H. | Super Power Co. of Illinois, Chicago, Ill. | "Save the Public From Nationalized Power" |
| O'Keefe, Elizabeth | Southern California Edison Co., Ltd., Ontario, Calif. | "Advantages of Electric Cookery for Domestic Purposes" |
| O'Loughlin, John | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "Public Relations and the Electric Light and Power Industry" |
| Packard, James R. | Consumers Power Co., Beaverton, Mich. | "Advantages of Electric Cookery for Domestic Purposes" |
| Peterson, Herbert E. | Narragansett Electric Co., Providence, R. I. | "Public Relations" |
| Phenicie, Robert | Wisconsin Public Service Corp., Wausau, Wis. | "Training for Robots" |
| Phillips, J. A. | Carolina Power and Light Co., Southern Pines, N. C. | "Public Relations" |
| Polan, Beatrice | New York Edison Co., Inc., New York, N. Y. | "Advantages of Electric Cookery for Domestic Purposes" |
| Porter, J. W. | Central Power and Light Co., Edna, Tex. | "Public Relations in the Electric Light and Power Industry" |
| Poutie, Ralph M. | Buffalo General Electric Co., Buffalo, N. Y. | "Advantages of Electric Cookery" |
| Purton, T. A., Jr. | Idaho Power Co., Boise, Idaho | "The Power Yardstick" |
| Quinn, Eileen F. | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "Cooking Efficiency Plus" |
| Quinn, E. Warner | Utica Gas and Electric Co., Utica, N. Y. | "Advantages of Electric Cookery for Domestic Purposes" |
| Range, Willard | Georgia Power Co., Atlanta, Ga. | "Public Relations" |
| Reed, Ezekiel C. | Atlanta City Electric Co., Atlantic City, N. J. | "Mr. Average Man Views the Public Utilities" |
| Renshaw, Paul | Memphis Power and Light Co., Memphis, Tenn. | "Practical Public Relations in the Electric Light and Power Industry" |
| Reynolds, Robert I. | Syracuse Lighting Co., Inc., Syracuse, N. Y. | "A Letter to Mrs. Johnny Q. Public from Reddy Kilowatt" |
| Rickard, Anne M. | Appalachian Electric Power Co., Charleston, W. Va. | "Advantages of Electric Cookery for Domestic Purposes" |
| Riordan, Mrs. F. C. | Washington Water Power Co., Spokane, Wash. | "Advantages of Electric Cookery for Domestic Purposes" |
| Saunderson, Geo. E. | New York Edison Co., Inc., New York, N. Y. | "The Objectives of Equipment Testing" |
| Sawyer, Chester B. | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "The Importance of Public Relations in the Electric Light and Power Industry" |
| Sawyer, O. E. | New England Power Engineering and Service Corp., Providence, R. I. | "Comparison of Wye-Delta and Open Wye-Open Delta Distribution Transformer Connections" |
| Schmalz, Eleanor L. | Duquesne Light Co., Pittsburgh, Pa. | "Advantages of Electric Cookery for Domestic Purposes" |
| Schoening, P. H. | New York Edison Company, Inc., New York, N. Y. | "The Advantages of the Domestic Electric Range" |
| Schweitzer, George | Interstate Light and Power Co., Galena, Ill. | "Public Relations" |
| Schwerer, F. C., and B. C. Sprague | West Penn Power Co., Pittsburgh, Pa. | "Injury to Utility Companies Resulting from the Improper Application of the Straight Line Depreciation Method in Rate Cases" |
| Shafer, Carl B. | Public Service Co. of Colorado, Salida, Colo. | "Advantages of Electric Cookery" |
| Shaney, Desire | Wisconsin Public Service Corp., Minocqua, Wis. | "Advantages of Electric Cookery for Domestic Purposes" |
| Shipley, Fern | Utah Power and Light Co., Preston, Idaho | "Advantages of Electric Cookery for Domestic Purposes" |
| Simone, L. M. | Narragansett Electric Co., Providence, R. I. | "Public Relations and the Employee" |
| Smith, Ruby | Utah Power and Light Co., Salt Lake City, Utah | "A More Abundant Life for Martha" |
| Smith, Wilfred F. | British Columbia Electric Railway Co., Ltd., Vancouver, B. C. | "Advantages of Electric Cookery for Domestic Purposes" |
| Spahr, Gustav L. | Philadelphia Electric Co., Philadelphia, Pa. | "Public Relations" |
| Sprague, B. C., and F. C. Schwerer | West Penn Power Co., Pittsburgh, Pa. | "Injury to Utility Companies Resulting from the Improper Application of the Straight Line Depreciation Method in Rate Cases" |
| Stermer, Harry G. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "How to Increase the Usefulness of the Accountant in the Public Utility Industry" |
| Strong, Langdon D. | Wisconsin Public Service Corp., Green Bay, Wis. | "Advantages of Electric Cookery for Domestic Purposes" |
| Stueve, W. H. | Oklahoma Gas and Electric Co., Oklahoma City, Okla. | "Are 'Class' Power Rates Justified?" |
| Taber, Leonard S. | Narragansett Electric Co., Providence, R. I. | "The Current Utility Problem" |
| Thomas, Harold P. G. H. | Potomac Edison Co., Hagerstown, Md. | "Public Relations" |
| Tillery, W. H. | Georgia Power Co., LaGrange, Ga. | "Public Relations in the Electric Light and Power Industry" |
| Tourigny, Chas. E. | Shawinigan Water and Power Co., Montreal, Can. | "The Privilege of the Utilities to Eat Their Cake and Have It" |
| Trodahl, Alfred J. | Commonwealth Edison Co., Chicago, Ill. | "Everbest" |

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| Trulock, Guy E. | Commonwealth Edison Co., Chicago, Ill. | "Going the Second Mile" |
| Tune, G. S. | Pacific Gas and Electric Co., San Francisco, Cal. | "Load Factor Improvement and Load Building by a New Method" |
| Turner, George E. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Public Relations in the Electric Light and Power Industry" |
| Vandervelde, H. | Commonwealth Edison Co., Chicago, Ill. | "The Courtesy That Is an Asset to Good Public Relations" |
| Verber, William R. | Commonwealth Edison Co., Chicago, Ill. | "Meeting the Public" |
| Vogel, Orrin S. | Georgia Power Co., Atlanta, Ga. | "Depreciation—In Electric Utilities" |
| Waddell, J. D. | Duquesne Light Co., Pittsburgh, Pa. | "Employee Contact Training Promotes Good Will" |
| Wade, Hugh R. | Kansas City Power and Light Co., Kansas City, Mo. | "Public Relations in the Electric Light and Power Industry" |
| Waldorf, S. K. | Pennsylvania Water and Power Co., Baltimore, Md. | "Progress Toward Lightning-Proof Transmission Lines" |
| Ward, H. T. | North Dakota Power and Light Co., Dickinson, N. D. | "Public Relations" |
| Wardenburg, H. A. | Commonwealth Edison Co., Chicago, Ill. | "Factors Affecting Public Relations" |
| Wardenburg, H. A. | Commonwealth Edison Co., Chicago, Ill. | "Depreciation and Its Relation to the Rate Base" |
| Wardenburg, H. A. | Commonwealth Edison Co., Chicago, Ill. | "Maintenance and Its Relation to the Rate Base" |
| Weber, Herbert L. | Puget Sound Power and Light Co., Seattle, Wash. | "Better Public Relations Thru Meter Testing" |
| White, George F. | Webster & Southbridge Gas and Electric Co., Worcester, Mass. | "Keeping a Vigilant Eye on Public Relations" |
| White, Madeline | Northwestern Public Service Co., Huron, S. D. | "—— Are Sisters Under the Skin" |
| Woodard, Anne E. | Tennessee Electric Power Co., Cleveland, O. | "Oil for the Troubled Waters" |
| Woodsum, C. E. | New Hampshire Gas and Electric Co., Portsmouth, N. H. | "Good Public Relations" |
| Woolf, G. W. | Western Public Service Co., Scottsbluff, Nebr. | "What Does the Future Hold?" |
| Young, Edward W. | Edison Electric Illuminating Co. of Boston, Boston, Mass. | "Electric Cookery" |
| Zeglio, Leon P. | Brooklyn Edison Co., Inc., Brooklyn, N. Y. | "Relations Between the Supervisor and the Employee in Industry" |
| Zillessen, Clara H. | Philadelphia Electric Co., Philadelphia, Pa. | "The Gentle Art of Dining Considers the Electric Range!" |
| Zubair, S. M. | Buffalo Niagara and Eastern Power Co., Buffalo, N. Y. | "Relation Between Price and Residential Use of Electricity" |

# The Second Birthday Anniversary of the I. E. S. Better Sight Lamps

THE greatest advertising campaign ever put behind any sort of portable lamps will appear in October. In this one month a concerted effort is going to be made to sell more than a million I.E.S. Better Sight Lamps. This is at the rate of one lamp to every five wired homes. In view of the careful planning given to the advertising and promotion, it is confidently predicted that this quota will be realized.

Approximately $85,000 will be spent in national magazines to tell the public that the "Birthday Anniversary" lamp is the best value ever offered to the public. Much of the advertising will be in color.

The Mazda lamp manufacturers are increasing their space in national advertising during the month of October, in addition to the advertising previously scheduled for that period. The Special Anniversary Sale will be featured in all the advertising of the I.E.S. Better Sight Lamp Makers in October.

Each approved manufacturer of the I.E.S. Lamps is designing a special lamp to be designated as a "Second Anniversary" model. These models are going to represent the best value that they are able to produce, and will bear a special Anniversary tag. Each manufacturer will have one Anniversary model for each type of lamp that has the I.E.S. approval. "Birthday Anniversary" lamps were introduced at the July shows in Chicago and New York.

The manufacturers have available for their customers: Preprints of all the advertisements which will appear during the month of October; a variety of merchandising tie-up plans for utilities, department stores, furniture stores, and dealers; a complete newspaper mat service, and window and store displays.

In many places Utilities have held meetings and arranged programs with department stores and furniture stores for local tie-in with the national campaign.

With the recent announcement of the I.E.S. Approval for end table lamps, the line has been expanded until now there is a scientifically designed lamp for every practical purpose and location in the home. The surface of this market has only been scratched. By the end of October there will be approximately 2,000,000 I.E.S. tag lamps sold, only a fraction of the potential market of 34,000,000 lamps. "It is only the beginning!"

# POWER SALES ITEMS

## AIR CONDITIONING

"And Now—The Air Conditioned Billboard." *Heating, Piping and Air Conditioning,* July, 1936, p. 364. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

This is a description of a billboard on Michigan Avenue, Chicago, in which are exhibited pedigreed dogs in order to attract attention to the Ideal Dog Food prepared by Wilson and Company. This is interesting from the point of view that it presents a new field for the use of air conditioning.

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"Application Factors Which Govern the Selection of Refrigerating Equipment for Air Conditioning Service," by J. R. Hertzler. *Heating, Piping and Air Conditioning,* July, 1936, p. 391. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

This article, while more or less technical, gives a large amount of valuable information which is worth while, for those following air conditioning.

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"Largest Air Conditioned Hotel Has Six Zone System," by J. R. Hertzler. *Heating and Ventilating,* July, 1936, p. 59. The Industrial Press, 148 Lafayette Street, New York City, Publishers.

In progressive San Antonio, the third largest city in the state, is located the newly modernized St. Anthony—the world's largest completely air conditioned hotel.

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"Heating and Cooling Kress' Fifth Avenue 5, 10 and 25," by A. F. Crowley. *Heating and Ventilating,* July, 1936, p. 27. The Industrial Press, 148 Lafayette Street, New York City, Publishers.

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"Solving the Four Types of Process Air Conditioning Problems," by William Goodman. *Heating, Piping and Air Conditioning,* July, 1936, p. 373. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

All air conditioning problems fall into one of four main divisions, depending upon whether the sensible and latent heat are being subtracted from, or added to, the space being conditioned. Problems typical of each division are discussed here and solutions by the psychrometric chart explained.

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"Air Conditioning a Tailor Shop." *Electrical South,* July, 1936, p. 20. W. R. C. Smith Publishing Company, Grant Building, Atlanta, Ga., Publishers.

This article points out the advantages of air conditioning in a tailor shop and tells of one particular installation in Miami, Fla. Business increased during the first two months 35 per cent over the previous year. The increased volume paid for the installation within 90 days. The article stresses customer comfort during the fitting of clothes, increased efficiency of the sales force, and elimination of loss due to dirty goods by having a clean atmosphere.

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"Air Condition the Bakery Throughout," by W. W. Reece. *Heating, Piping and Air Conditioning,* August, 1936, p. 419. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

This article gives some very important points in favor of air conditioning in the bakery industry. It is quite notable that the author has given some excellent economic reasons, together with layouts and information suitable for the promotion of air conditioning in the bakery industry.

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"Air Conditioning Makes Severe Demands on Water Supply and Disposal Systems." *Heating, Piping, and Air Conditioning,* September, 1936, p. 491. Keeney Publishing Company, 6 N. Michigan Avenue, Chicago, Ill., Publishers.

This article brings up the question of the large amount of water required for condensing purposes in air conditioning systems and the ability of sewers to handle the waste water. This article is also further elaborated upon by L. L. Lewis, chief engineer of the Carrier Engineering Corporation and Walter L. Fleisher, consulting and advisory engineer, New York, both outstanding authorities on the subject. The article points out that a number of cities have been looking into such questions as the water supply and disposal when a large number of air conditioning plants are installed.

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"Apartment House in London Completely Air Conditioned," by J. W. Harvey. *Heating, Piping and Air Conditioning,* September, 1936, p. 495. Keeney Publishing Company, 6 N. Michigan Avenue, Chicago, Ill., Publishers.

This article is very interesting in that it points out the choosing of the type of system, control and operation. It also describes the air conditioning problems and gives the reasons for individual plants being selected in place of a central system.

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"What the Operating Force Must Know for Effective, Efficient Air Conditioning," by Rush D. Touton. *Heating, Piping and Air Conditioning,* September, 1936, p. 500. Keeney Publishing Company, 6 N. Michigan Avenue, Chicago, Ill.

This article gives some very good information on the training of the operator and the operating crew when air conditioning is used in industrial plants.

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"Air Conditioning for Health." *Heating, Piping and Air Conditioning,* September, 1936, p. 502. Keeney Publishing Company, 6 N. Michigan Avenue, Chicago, Ill.

This article carries a little historical sketch covering some of the experiments with air conditioning for health by Dr. Gorrie which took place a hundred years ago. It also points out some of the diseases in which air conditioning is used to assist in combating such diseases.

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"Cooperation with the Medical Profession," by Walter L. Fleisher. *Heating, Piping and Air Conditioning,* August, 1936, p. 426. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

The author points out that air conditioning for health is important. He also quotes Dr. Mills of Cincinnati and Dr. Huntington of Yale showing that the climatic conditions in which people live have an important bearing on their health.

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"Building Meters Air Conditioning Service," by Paul E. Holcombe. *Heating, Piping and Air Conditioning,* August, 1936, p. 437. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

This article deals with a method of measuring or metering refrigeration service so that the cost may be allocated to the various tenants.

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"Progress in Air Conditioning in the Last Quarter Century," by W. H. Carrier. *Heating, Piping and Air Conditioning,* August, 1936, p. 447. Keeney Publishing Company, 6 North Michigan Avenue, Chicago, Ill., Publishers.

This article is largely historical and describes the early installations in the industrial field; also a comparison of present day equipment with that in use in the early days of the business.

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"St. Anthony Hotel Completely Air Conditioned," by J. R. Hertzler. *Southern Power Journal,* August, 1936, p. 20. W. R. C. Smith Publishing Company, Grant Building, Atlanta, Ga., Publisher.

A review of the design and operation of air conditioning installation in public and guest rooms of the St. Anthony Hotel in San Antonio, Tex.

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"Dehumidification Smooths the Curve in a Pharmaceutical Plant," by C. W. Swenson. *Heating and Ventilating,* August, 1936, p. 52. The Industrial Press, 148 Lafayette Street, New York City, Publishers.

Desirable humidities for industrial processes.

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## COMMERCIAL SALES

"The Importance of Cost Control in the Sales Department," by H. J. Perkner. *U. G. I. Circle,* July, 1936, p. 8. United Gas Improvement Company, 1401 Arch Street, Philadelphia, Pa., Publishers.

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## DIESEL ENGINES

"Waste Heat Recovery from Diesels," by E. G. Sims. *Power Plant Engineering,* July, 1936, p. 407. Technical Publishing Company, 53 West Jackson Blvd., Chicago, Ill., Publishers.

Economizers and heat exchangers offer means of greatly improving thermal efficiency of plant.

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## ELECTRIC DRIVE

"Bethlehem's 72-In. Sheet-Strip Mill," by F. D. Egan. *Electrical World,* August 1, 1936, p. 2322. McGraw-Hill Co., Inc., 330 West 42nd Street, New York City, Publishers.

Centralized control, interlocking, short-circuit protection, heavy power concentration feature latest of wide strip electrifications.

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## ELECTRIC FURNACES

"Heating Elements," by Dr. W. Rohn and John E. W. Ginger. *Heat Treating and*

*Forging,* June, 1936, p. 299. Steel Publications, Inc., 108 Smithfield Street, Pittsburgh, Pa., Publishers.

In this article the authors discuss various electric heating element alloys and factors that influence their useful life including furnace atmospheres, design of heating elements, cycles of operation, etc. The recently developed chromium-aluminum-iron alloys are discussed as well as ceramic rods made of silicon-carbide.

## ELECTRIC HEATING

"Application of Electric Immersion Units to the Heating of Liquids," by R. M. Cherry. *General Electric Review,* June, 1936, pp. 271-273. General Electric Company, 1 River Road, Schenectady, N. Y., Publishers.

In this article the author gives a few general rules to follow in applying immersion heaters to the heating of liquids, and works out a typical example.

"The Application of Electric Heating Units to Soft Metal Melting," by R. M. Cherry. *General Electric Review,* July, 1936, p. 344. General Electric Company, 1 River Road, Schenectady, N. Y., Publishers.

A major field for electric immersion heating. Construction and installation of the unit.

## ELECTRIC KITCHENS

"Large Electric Kitchens. Present and Prospective Loads. Cooking Tariffs and Energy Control. Apparatus Layout and Maintenance. Foreign Commercial Installations." *Electrician* (London), June 12. 1936, p. 759. Bouverie House, 154 Fleet Street, London E. C. 4, England, Publishers.

## FUEL

"Oil Burners for Power Boilers," by J. O. Gibbons. *Power Plant Engineering,* August, 1936, p. 461. Technical Publishing Company, 53 West Jackson Blvd., Chicago, Ill., Publishers.

Success in the use of fuel oil for steam generation depends in large measure upon the selection of the proper type of oil burner.

## FUEL COSTS

"Use Value of Coal for Steam Generation," by C. C. Wilcox, J. W. Nash. *Power Plant Engineering,* August, 1936, p. 452. Technical Publishing Company, 53 West Jackson Blvd., Chicago, Ill., Publishers.

Price of coal f.o.b. plant is only one of the many factors involved in the selection of fuel; their costs range from 6 to 20 per cent of the cost of evaporation.

## HEATING

"Degree-Day Methods Offer Attractive Heating Economies," by R. E. Hieronymus. *Heating and Ventilating,* August, 1936, p. 45. The Industrial Press. 148 Lafayette Street, New York City, Publishers.

## INDUSTRIAL ELECTRIFICATION

"Case Hardening and Heat Treatment with Liquid Cyanides," by E. G. Bishop. *Heat Treating and Forging,* June, 1936, p. 282. Steel Publications, Inc., 108 Smithfield Street, Pittsburgh, Pa., Publishers.

This article presents a complete resume of the cyanide process, its advantages and disadvantages and the various metallurgical reactions. Numerous hints regarding auxiliary equipment to use in the process are also included.

## LIGHTING

"Office Lighting Trends," by L. V. James. *Transactions of the Illuminating Engineering Society,* June, 1936, p. 598. Illuminating Engineering Society, 29 West 39th Street, New York City, Publishers.

Trends in office lighting practice and typical examples of recent installations.

"The Marquette Building, Chicago, Illinois, 'Office of the Future,'" by E. Shultz. *Transactions of the Illuminating Engineering Society,* June. 1936, p. 605. Illuminating Engineering Society, 29 West 39th Street, New York City, Publishers.

The problem of renting space in a typical office building, and ways in which this problem was solved through providing better light for the tenants.

"'Better - Light' Sales, Load-Building Value," by B. E. Miller. *Electrical World,* August 1, 1936, p. 2330. McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City, Publishers.

The record of a local study of increased consumption where "Better-Sight" demonstrations have been made.

## POWER SALES

"Industrial Power Data Sheets." *Electrical World,* July 4, 1936, p. 70. McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City, Publishers.

Data sheet for the third industry in the series to serve power sales and electrical engineers in industries that should be using more electrical equipment.

"Can Purchased Power Be Advertised?" *Electrical World,* July 18, 1936, p. 38. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City, Publishers.

Short articles proving central station power can be advertised.

"Oil Refineries Using More Electric Power," by R. Henry. *Electrical World,* August 15, 1936, p. 2489. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

Recent developments in equipment for safety and economy influence the decision on utilization of water for power production.

## PROCESS STEAM

"The Use of Process Steam for Power Generation," by H. H. Foreman. *Gas Age Record,* August 8, 1936, p. 149. Robbins Publishing Co., 9 East 38th Street, New York City, Publishers.

A study of four gas-fueled manufacturing plants which shows savings made by using process steam to generate electricity.

## RATE EQUIVALENT

"The Kilowatt-Hour Equivalent," by N. Henry Gellert, President, National Public Utilities Corporation. *Gas Age Record,* May 9, 1936, p. 495. Robbins Publishing Company, 9 East 38th Street, New York City, Publishers.

The author tells of a new gas rate based on gas equivalent of the kwhr. This was brought out to meet electric competition in North Carolina.

## RESEARCH

"Research Trends in the Power Industry," by C. F. Hirshfeld. *Power Plant Engineering,* July, 1936, p. 398. Technical Publishing Company, 53 West Jackson Blvd., Chicago, Ill., Publishers.

A few of the things that are engaging the time and efforts of those entrusted with improving equipment and practice.

## STEEL MILLS

"Analysis of Electric Power Costs," by J. W. Bates, Carnegie-Illinois Steel Corporation, Pittsburgh, Pa. *Iron and Steel Engineer,* July, 1936, p. 10. Association of Iron and Steel Electrical Engineers, Empire Building, Pittsburgh, Pa., Publishers.

Paper and discussion with charts, tables and examples, comparing generating and purchasing methods of power for a large steel mill.

## STEEL TREATMENT

"Surface Hardening of Steel," by C. T. Eakin. *Iron Age,* July 23, 1936, p. 25. Iron Age Publishing Company, 239 West 39th Street, New York City, Publishers.

This article discusses the processes of carburizing and nitriding, the types of steel best suited to each process and the advantages and disadvantages in the use of each method.

"Vertical Furnaces," by F. E. Harris, Buick Motor Car Company, Flint, Mich. *Metal Progress,* August, 1936, p. 52. American Society for Metals, 7016 Euclid Avenue, Cleveland, Ohio, Publishers.

Description of vertical gas burning furnace for hardening and tempering, giving the advantage of space, fuel efficiency and convenient stock handling.

## THERMOSTATIC CONTROLS

"Selection and Application of Thermostats for Industrial Service," by R. D. Ktner. *General Electric Review,* May, 1936, pp. 237-243. General Electric Company, 1 River Road, Schenectady, N. Y., Publishers.

Definition of terms used in connection with thermostatic control—variance in types of thermostats—variance in mechanism—operation of mechanism—temperature differential—location of bulbs.

## WELDING

"Annealing and Forging Performed on Standard Resistance Welders," by R. L. Briggs, *Iron Age,* July 23, 1936, p. 20. Iron Age Publishing Company, 239 West 39th Street, New York City, Publishers.

The author outlines some of methods by which a standard resistance welding machine may be used for heat treating operations and for heating and upsetting.

## Home Electric Uses

(*Continued from page* 370)

the way from $479 to $1,310. On the major pieces of equipment he found an average of $645, not including house wiring. Mr. Damon had arrived at an inventory of standard type of appliances at $1,046 per house.

He mentions in very vigorous language the necessity for a better understanding of the relationship between the cost of equipment and the so-called bargain rates for service. He also discusses the so-called yardstick as exemplified in some phases of government activity.

Mr. Damon says, among other things, "So long as the cost of wiring prevents houses from being wired, the people will be denied that 'larger life' which electricity might give, and reduced rates for domestic service will not alone accomplish its full purpose." The words "larger life" are in quotation.

He gives some interesting analyses of the cost of range installations in 1930 and 1935, and shows that all the way through there is a tendency to increase the cost of certain equipment which, in my personal opinion, should be simplified rather than made more complex.

Mr. Schaaf suggests that the substance of this discussion is that the cost of appliances is a very important factor in the consumption, and that rates represent another factor, and that there are additional factors which enter into the picture. Also, in different parts of the country the advancement of the people enters into the picture.

I think Mr. Schaaf is correct. There are probably factors that are as yet undisclosed, and we know positively that there is an educational factor. We also know that there are people who can afford to put in appliances but who will not change their living habits. There are also a number of other things we don't know. We don't know very much about people's habits of mind and their habits of living, and we are trying to study these problems all the time.

With the present tendency of grade schools and high schools to teach more about home economics, there is being developed a class of young people who will understand more about the desirability of electric service. When you stop to think that only about 20 per cent of our customers have been prevailed upon to buy electric ranges, you will see that we have a long way to go; and I don't see how we are going to get to the end that we are after without more demonstration, without more publicity, and without more load building and business building activity.

For several years business has been unsatisfactory, and we are doing things that we believe will bring back some of the business that we have lost. It is our judgment that if an organization is about to sink, what it needs is a life preserver. A life preserver may bring an organization up out of deep water to a point where there is a chance to breathe the air that will revive business. That is just what we are trying to do.

Our new business activity has been a life preserver for the Pacific Company. It has made it possible for us to develop high residence consumption. I think right now we are moving into an era where there will be a great deal of customer purchasing. We are already beginning to see evidence of it. The automobile people have had it; the tourist trade is having it this year.

We think now is the time to carry on extensively our education work, even more extensively than ever, and I don't think this is the time to let up on it at all.

## CONVENTIONS AND MEETINGS

### SEPTEMBER

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|---|---|
| 1- 3 | Illuminating Engineering Society, Statler Hotel, Buffalo, N. Y. |
| 7-12 | Third World Power Conference, Washington, D. C. |
| 9-11 | Pennsylvania Electric Association, Bedford Springs Hotel, Pa. |
| 9-19 | National Electrical and Radio Exposition, Grand Central Palace, New York, N. Y. |
| 12-13 | Maryland Utilities Association, George Washington Hotel, Ocean City, Md. |
| 18-19 | West Virginia Public Utilities Association, White Sulphur Springs, W. Va. |
| 20-23 | American Transit Association, White Sulphur Springs, W. Va. |
| 21-23 | Rocky Mountain Electrical Association, Sante Fe, N. M. |
| 22-25 | Association of Iron and Steel Electrical Engineers, Detroit, Mich. |
| 28-29 | Prime Movers Committee, Cleveland Hotel, Cleveland, Ohio. |
| 28-30 | National Electrical Wholesalers Association, Hotel Statler, Buffalo, N. Y. |

### OCTOBER

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| 1- 2 | Empire State Gas & Electric Association, Saranac Inn, N. Y. |
| 1- 2 | Indiana Electrical Association, French Lick, Ind. |
| 4- 9 | National Electrical Manufacturers Association, Netherland Plaza Hotel, Cincinnati, Ohio. |
| 5- 9 | National Safety Council Congress, Atlantic City, N. J. |
| 9 | Sales Committee, E.E.I. Headquarters, New York, N. Y. |
| 7-10 | Electrochemical Society, Niagara Falls, Ont. |
| 8- 9 | Transmission and Distribution Committee, E.E.I., Peabody Hotel, Memphis, Tenn. |
| 12-14 | National Electrical Contractors Association, Biltmore Hotel, Atlanta, Ga. |
| 19-20 | Accident Prevention Committee, E. E. I., Lord Baltimore Hotel, Baltimore, Md. |
| 26-27 | Electrical Equipment Committee, E.E.I., Sagamore Hotel, Rochester, N. Y. |
| 26-30 | American Gas Association, Atlantic City, N. J. |

### NOVEMBER

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| 10-13 | National Association of Railroad and Utilities Commissioners, Atlantic City, N. J. |
| 30 | American Society of Mechanical Engineers, New York, N. Y. |

### DECEMBER

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| 1- 4 | American Society of Mechanical Engineers, New York, N. Y. |
| 25-29 | American Institute of Electrical Engineers, New York, N. Y. |

## Circulation in Boilers

(*Continued from page* 394)

quate unless it is in the proper direction and of such volume as to make the use of cores or other corrective appliances unnecessary. The proper basis of design, in regard to circulation, therefore, would seem to be the establishment of definite relationships between the boiler pressure, the rate of steam output per unit of heating surface, and those physical dimensions of the boiler which are responsible for the production or limitation of circulating head.

The trend toward higher and higher boiler ratings has complicated boiler circulation difficulties, and has imposed many new problems of design on the boiler manufacturer. Boilers of the straight tube type are now being built with greatly increased distances between the drum and the top generating tubes. This fact alone should assist materially in eliminating the difficulty that was inherent in boilers of this type a few years ago.

It is not expected that the spinner and the test methods which are menioned in this article will, in themselves, provide a means for obtaining a complete solution to the circulation problem, but it is hoped they will serve as another step toward that ever present objective—better boilers.